PACKAGE engineering

One automatic machine does five jobs

A close look at a single machine automatically performing five separate packaging jobs for a non-uniform product shows the importance of real cooperation of package user, machinery makers and material supplier. (See Page 39)

How full should you fill your bag?

Using a simple method of finding capacity and per cent of fill for a flexible package to find out just how large the package can be—regardless of the shape it assumes when you stack it, hang it or hold it in your hand. (See Page 44)

Don't let down-time throw you for a loss

Adequate, planned training of mechanics and their proper assignment and use within your plant, along with systematic, preventive maintenance, go far in cutting down-time for machine change-overs and repairs. (See Page 48)

Complete table of contents on Page 2

SEPTEMBER 1960

VOLUME 5 • NUMBER 9

The master barber shaves packaging costs with bundling by Scandia

The Gillette Company uses Scandia Bundling Machines to overwrap its wide variety of distribution packages. Why? The reason is obvious. Crisp cellophane overwraps with opening tape are attractive, easily identified, and easy to handle.

But most important are the economies Scandia Bundlers can bring you. Using either plain or registered, printed film or Kraft paper you can effect up to 80% savings *on materials costs alone*. Hand filling display containers is eliminated, too. And your cost of warehousing packaging materials can be sharply reduced.

The individual cartons containing Gillette blades or Gillette dispensers are also wrapped on high-speed money-saving Scandia machines.

Call or write today for an analysis of your overwrapping needs. No obligation on your part. Scandia Packaging Machinery Company, North Arlington, New Jersey. WYman 1-8400.

SCANDIA
MEANS CRAFTSMANSHIP

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Aluminum Foil Packaging Plastic Film Laminations

One of a Series of Reports by Reynolds Metals Co.

The important functional properties of aluminum foil for packaging can obviously be supplemented by combining aluminum foil with other materials. Previous reports in this series have discussed many combinations.

The Broadest Field

The broadest field for such expansion of packaging properties is the combination of plastic films and coatings with aluminum foil. Various plastics can add heat sealability, improved flexibility, scuff resistance and greater overall durability to the protective qualities inherent in the foil alone. In fact, combinations of foil with plastic films have produced a whole new family of materials — making possible flexible packages, and also unit packages, for products which formerly could use nothing except conventional rigid containers.

Adhesive Laminating

In early developments, these combinations were achieved by adhesive laminating. This type of process is too expensive for many packaging applications even when the laminate is a simple two-layer combination. As laboratory exploration advanced into more complex structures, the cost increased — limiting the application of some materials to products requiring very special protection. During this time, and pending a solution to the economics of the problem, valuable research data was accumulated in complex laminates having many properties. These were sometimes difficult to trace to particular components, where several contributed in varying degree. But basic categories were established.

For example, combinations of polyester films with aluminum foil provide materials with exceptional strength. Reverse-printed cellulose acetate or cellophane films laminated to foil provides materials with high gloss and aesthetic properties. Saran and pliofilm in combinations with aluminum foil contribute properties of gas impermeability.

The economics of combination plastic-foil packaging was revolutionized by the development of extrusion coating. This high speed process extrudes suitable resins and polyolefins under pressure and heat directly upon the aluminum foil — to serve either as a final coating or layer of the structure, or to act as an adhesive for a further layer. Cost is much reduced, as compared to regular laminating. Therefore, this type of protection becomes available to a wide and steadily increasing variety of products.

Pilot Plant Operation

Recognizing the vast possibilities, the Reynolds Metals Company pioneered in this field. The Pilot Plant of Reynolds Research and Development Laboratory is equipped with the most modern plastic extrusion machinery — including a web carrying unit having turret unwinds, turret rewinds, an extra large cooling drum, slitting knives, and a secondary unwind to permit laminating two webs with the extruded plastic. This plant manufactures samples and evaluates all materials under carefully controlled laboratory conditions, maintaining careful records. Only by such control can the right selection for a packaging application be made and duplication of the material on the production line be assured.

Besides its Pilot Plant operation, the Reynolds Metals Company also has production extruders strategically located across the country, to supply packaging material needs after evaluation and selection.

Thorough Materials Evaluation

The Pilot Plant, with its complete equipment, makes possible the thorough evaluation of all materials, including the variations in performance characteristics achieved by variations in the components. For instance, the plastic resin most frequently utilized for extrusion coating to date is polyethylene. It has the unusual properties of heat sealability at relatively low temperature, low Water Vapor Transmission Rate and chemical resistance, coupled with ease of processing. But variations in the polyethylene specification can produce a wide variety of characteristics, which must be thoroughly evaluated so that choices for particular end uses can be based on actual test data.

The accompanying chart shows how effectively even the lightest gauges of aluminum foil together with an extremely light coating of polyethylene will achieve Water Vapor Transmission Rates greatly superior to much heavier gauges of polyethylene film by itself. In addition, economies can be effected by the combination.

For Further Information

Many plastic and aluminum foil combinations originally custom made by Reynolds for particular products are now on the market. One of them may well suit your needs. Or adaptations can be developed and thoroughly tested in the Pilot Plant. For further information on this or any phase of aluminum foil packaging, call the nearest Reynolds sales office. Or write to **Reynolds Metals Company,** Richmond 18, Virginia.

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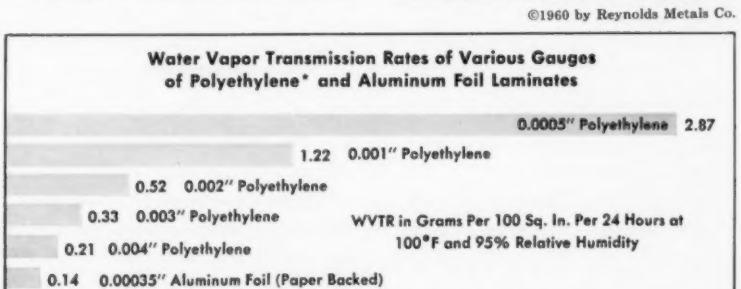
Water Vapor Transmission Rates of Various Gauges of Polyethylene* and Aluminum Foil Laminates
0.0005" Polyethylene 2.87
1.22 0.001" Polyethylene
0.52 0.002" Polyethylene
0.33 0.003" Polyethylene
0.21 0.004" Polyethylene
WVTR in Grams Per 100 Sq. In. Per 24 Hours at 100°F and 95% Relative Humidity
0.14 0.00035" Aluminum Foil (Paper Backed)
0.05 0.0005" Polyethylene—0.00035" Aluminum Foil (Paper Backed)
0.03 0.001" Polyethylene—0.001" Aluminum Foil
*Low Density

NEW TV SHOW! Starting Oct. 7 Reynolds Aluminum presents "HARRIGAN AND SON," starring Pat O'Brien—every Friday evening. Also "ALL-STAR GOLF," Saturdays. ABC-TV.

For your calendar

September 12-16. The University of Kansas plant layout and materials handling courses:
Town House Hotel, Kansas City, Kan. Contact: Edward S. Avison, The University of Kansas Extension Center, 39th and Rainbow Blvd., Kansas City 12, Kan. *Telephone: KEndall 2-1538.*

September 14. Packaging Institute professional member seminar on folding cartons:
Drake Hotel, Chicago, Ill. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

September 20-21. Research and Development Associates military-industry conference:
Stock Yard Inn, Chicago, Ill. Contact: Col. R. A. Isker, secretary, Research and Development Associates, QM Food and Container Institute, 1819 W. Pershing Road, Chicago 9, Ill. *Telephone: LAfayette 3-5500, ext. 4262 or 4267.*

September 25-30. University of California's 2nd annual packaging, plant layout and material handling short course:
UCLA Conference Center, Lake Arrowhead, Calif. Contact: Engineering Extension, Room 6266G, Engineering Building, Unit II, University of California, Los Angeles 24, Calif. *Telephone: GRanite 3-0971, ext. 9877.*

September 28. Packaging Institute professional member seminar on resins:
Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

September 28-30. AMA workshop seminar on plastic containers for packaging:
La Salle Hotel, Chicago, Ill. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

October 31-November 2. Packaging Institute 22nd Annual National Packaging Forum:
Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

October 31-November 4. AMA packaging management course:
Hotel Astor, New York, N.Y. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

1961: November 7-10. Packaging Machinery Manufacturers Institute Show of 1961.
Cobo Hall, Detroit, Mich. Contact: W. L. Redding, Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: ATlantic 1-8552.*

SEPTEMBER 1960 • VOLUME 5 • NUMBER 9

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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44 **It's easy to find fill per cent of flexible pouches,** by Mary A. Ciamarella, Assistant Laboratory Supervisor, Container Laboratories, Inc.
Offers method for finding capacity and per cent fill of a package whose shape changes depending on whether it is hanging, lying down, or being held.

48 **Trained mechanics, preventive maintenance, reduce machine down-time,** by John D. Breslin, Manager, Packaging Department, The Wm. S. Merrell Company
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60 **Partially mechanized, large-volume packaging pays off,** by T. A. Seelos, Plant Manager, Welding Products Division, A. O. Smith Corporation
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68 **Statistical fill control means cost savings,** by Robert W. Roop, Vice President, and Millard M. Brenner, Staff Engineer, General Atronics Corporation
Explains fill distributions and limits, standard distribution, and choices the packagers have—whether fill is measured by weight, volume, height, or number.

79 **Pick your projects for profit—using economic evaluation,** by Edward M. Krech, Jr., Winton Hill Technical Center, The Procter & Gamble Company
Concluding this two-part article: Applying standard evaluation methods (including equations) to a typical packaging problem—a new packaging plant.

92 **Packaging machines cause mechanical stresses in flexible materials,** by H.-E. Roder, Farbwerke Hoechst A. G., Frankfurt, Germany, and Rudolf Heiss and G. Schricker, Institute for Food Technology & Packaging, Munich, Germany.
Final part of a three-part article discussing stresses imposed by wrapping machines (including twist-wrapping) and form-fill-and-seal bag machines.

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Reader Service Cards inside back cover

Our December, 1960 issue will carry a cumulative editorial index for the year, listing our feature articles by subject, author, and other headings.

GOODYEAR

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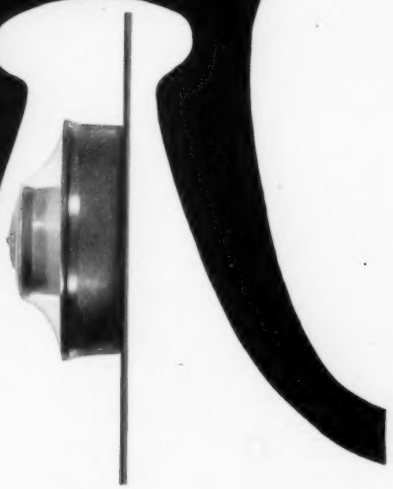

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GOODYEAR

Vitafilm, a Polyvinyl chloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

For more information circle No. 203 on Reader Service Card

A note from the publisher

Is packaging more complicated today than yesterday?

Recently in this column I said, "Prior to World War II, packaging was relatively uncomplicated, and the technical and engineering problems were simple by today's standards."

I had a letter from C. P. Olstad, technical director, Western-Waxide Division, Crown Zellerbach Corporation, commenting as follows:

". . . I am sure that many of us 'Old Timers' will take issue with this statement, and that the packaging advancements made in the 1930's are really the basis of ideas that many people believe are recent discoveries. Let me list some of these for you:

"1. Design of machine for making heat sealing pouches, today, commonly referred to as Bartelt machine, but in reality invention of one Percy Yeates of Toronto, Canada, wherein a web is folded over and heat seals made to form a tobacco pouch—the forerunner of all heat sealed pouches.

"2. Discovery of method of laminating extensible films to paper and foil, in those days Pliofilm, because it was the only extensible film possessing heat sealing and moisture-vaporproof qualities.

"3. Discovery of the method of coating rubberlike wax mixtures on cellophane, which is the basis of transparent heat sealing cheese wrappers and combinations of foil-cellophane-wax and Pliofilm-cellophane-wax.

"4. Laminating of metal foil to paper for spiral fibre can winding done in England in 1937, and forerunner of present foil biscuit cans. In those days the foil-lined fibre can was used for protection of a hydroscopic, barley crystal, drink mix.

"5. Method of producing metal foil lined folding cartons and die cutting and embossing of foil labels and box coverings, utilizing protective qualities of foil and its merchandising appeal, and successful printing of foil by rotogravure and flexographic.

"Successful use of microcrystalline waxes with rubberlike and resin additives for excellent adhesion of foil to glassine and other papers; also, for lamination of glassine papers which were forerunners of laminated structures currently used for potato chip bags, cake mix liners, etc.

"When I look at present day packages and recall the origin of the majority of the package machines and packaging materials, I find the greater majority of these materials were developed during those depression years of the 1930's, when necessity was really the mother of invention because of the requirements of long-term storage and world-wide shipping. Even the electric eye for automatic roll wrapping machines was born in those days, and you can realize the problems we had in operating a blue spot on gold foil, but it was done very successfully.

"In summary, packaging then was tremendously complicated because of the limited raw materials, limited converting machinery and the scarcity of package machine designers. . . ."

Our thanks to Reader Olstad for telling how today's packaging has drawn from past developments.

Angus J. Ray

Publisher

PACKAGE engineering®

AN ANGUS J. RAY PUBLICATION

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The PULSE/of packaging

Packaging across the seas:

EUROPEAN PACKAGING FEDERATION announces its first event in Scandinavia—a study trip to Sweden and a general assembly in Stockholm, September 12-14. Packaging of dairy products and use of electronic processing data machines in the packaging field are among topics up for discussion. Plant tours will cover fresh food distribution, self-service packaging, and transport packages and marking problems. EPF also plans a general meeting in Stockholm for September 12. Full information is available from its General Secretariat, 3 Rue La Boetie, Paris, France. . . . The organizing committee of IPACK (biennial international exhibition of packing and packaging; exhibition of machinery for the confectionery and foodstuff industries; mechanical handling exhibition) has changed the dates of this event. It will be held June 20-29, 1961, in Milan, Italy. . . . Proponents of the Dutch international packaging exhibition, MACROPAK, say their exposition, being held May 2-9, 1961, in Amsterdam, will be considerably larger than the 190,000 sq. ft. the 1959 show occupied. . . . Visitors to the British BREWING, BOTTLING AND ALLIED TRADES' EXHIBITION, being held at Olympia, October 3-7, will see a fibre glass case with rubber dividers—developed to replace metal crates now used in brewery packaging operations.

Meanwhile American participation in foreign programs continues. DOUGHBOY INDUSTRIES' Riley Livingston is directing an exhibit of American-made products packaged in transparent bags and sacks at the 25th International Fair of Thessaloniki, in Salonika, Greece, September 4-25.

TENNESSEE EASTMAN CO. and TEXAS EASTMAN CO., marketing divisions of Eastman Kodak Co., now have an international division which plans to form one company to be headquartered in Zug, Switzerland, and another to be based at Nassau—with offices also in Hong Kong. . . . HERCULES POWDER CO. plans to build a new plant in Springvale, Victoria, near Melbourne, Australia.

MILPRINT, INC. recently held an international seminar for its overseas affiliates with forty of its specialists from eleven countries meeting in Brussels. Speakers stressed the changes taking place in marketing and shopping habits due to wide-spread development of supermarkets. Those present heard that, because of diverse marketing conditions in different countries, development of new packaging ideas remains the primary responsibility of individual converters in each country.

Notes from the government:

The ORDNANCE CORPS' plastics and packaging laboratory at Picatinny Arsenal, Dover, N.J., is combining standardization work on plastics, adhesives and packaging materials into a newly formed standardization section, headed by George R. Rugger. Besides working on specifications, this group plans to summarize engineering information in handbooks and manuals—and will develop new or improved test methods as needed. Its staff anticipates active participation in technical societies, such as ASTM, SPE, and others.

Groups in the news:

PACKAGING INSTITUTE is moving full speed ahead with its program of regional meetings. Early in October it is holding a regional meeting on shipping containers at the Rodger Young Auditorium in Los Angeles. It expects an attendance of 200. (Contact: C. Paul Bolton. Carnation Research Laboratories, 8015 Van Nuys Boulevard, Van Nuys, Calif. STate 5-6596.) PI also is planning to hold a regional meeting on flexible packaging in San Francisco in January.

PACKAGING INSTITUTE will stress "packaging potentials for the 60's" at its 22nd annual National Packaging Forum being held in New York, October 31-November 2. Special features of the forum include a "Life" magazine presentation on opening day, plus seminars on packaging for self-service, research and development, corrugated and fibreboard materials, drug and pharmaceutical packaging, production line and machinery, printing, flexible packaging and plastics, food, closures, and an open meeting of the petroleum packaging committee. Some 50 participating packaging experts will present their professional forecasts for the decade and review trends, as well as offer technical and professional papers.

NATIONAL SAFE TRANSIT COMMITTEE INC. announces its plan to offer an annual safe transit award. This is intended to recognize outstanding individual accomplishment in reducing in-transit damage to industry's goods, according to NSTC. Underlying purpose is to recognize the leadership of resourceful and dedicated individuals responsible whenever an organization does an outstanding job in packaging, handling or transportation. Further information about the award is available from National Safe Transit Committee Inc., 1145 Nineteenth Street, N.W., Washington 6, D.C.

Trends to watch:

Package users can expect their suppliers to put more emphasis on technological improvements and new products. Further competitive influences make unlikely any across-the-board increase in selling prices. This is the opinion of the Value Line Investment Survey which predicts only "modest" profit gains for container companies this year. Although a further rise in sales appears in prospect, profit margins are narrowing, according to the survey.

REYNOLDS METALS CO. predicts a growing trend to aluminum foil bread wraps and sees new applications for aluminum in boil-in bags, and insulated cartons to keep beer chilled. But it also expects big gains for transparent films—predicting annual sales of water-soluble PVA film of 11 million lb. by 1965. Its experts think total yearly sales of transparent film will grow 67 per cent by 1965 representing an increase of about 465 million lb.

Weekly fibre box demands in 1960 should average 2,197 million sq. ft., as against 1959's level of weekly shipments of 2,108 million sq. ft., according to FIBRE BOX ASSOCIATION. It thinks demand for fibre boxes in 1960 will thus be 4 per cent above 1959 shipments, and that during the first half of 1961, there should be a 9½ per cent gain above the level of shipments of 1960's first half. FBA reports no possibility of a recession of 1961 and says the current quarter is the "low point" for the next 18 months.

Shipments of new, no-deposit beer bottles reported for the first six months of 1960 show a rise of 29 per cent above shipments for the corresponding period of 1959, according to GLASS CONTAINER MANUFACTURERS INSTITUTE. . . . Commercial production by early next year of a new fluorohalocarbon film featuring transparency and nearly zero moisture absorption is predicted by ALLIED CHEMICAL, its

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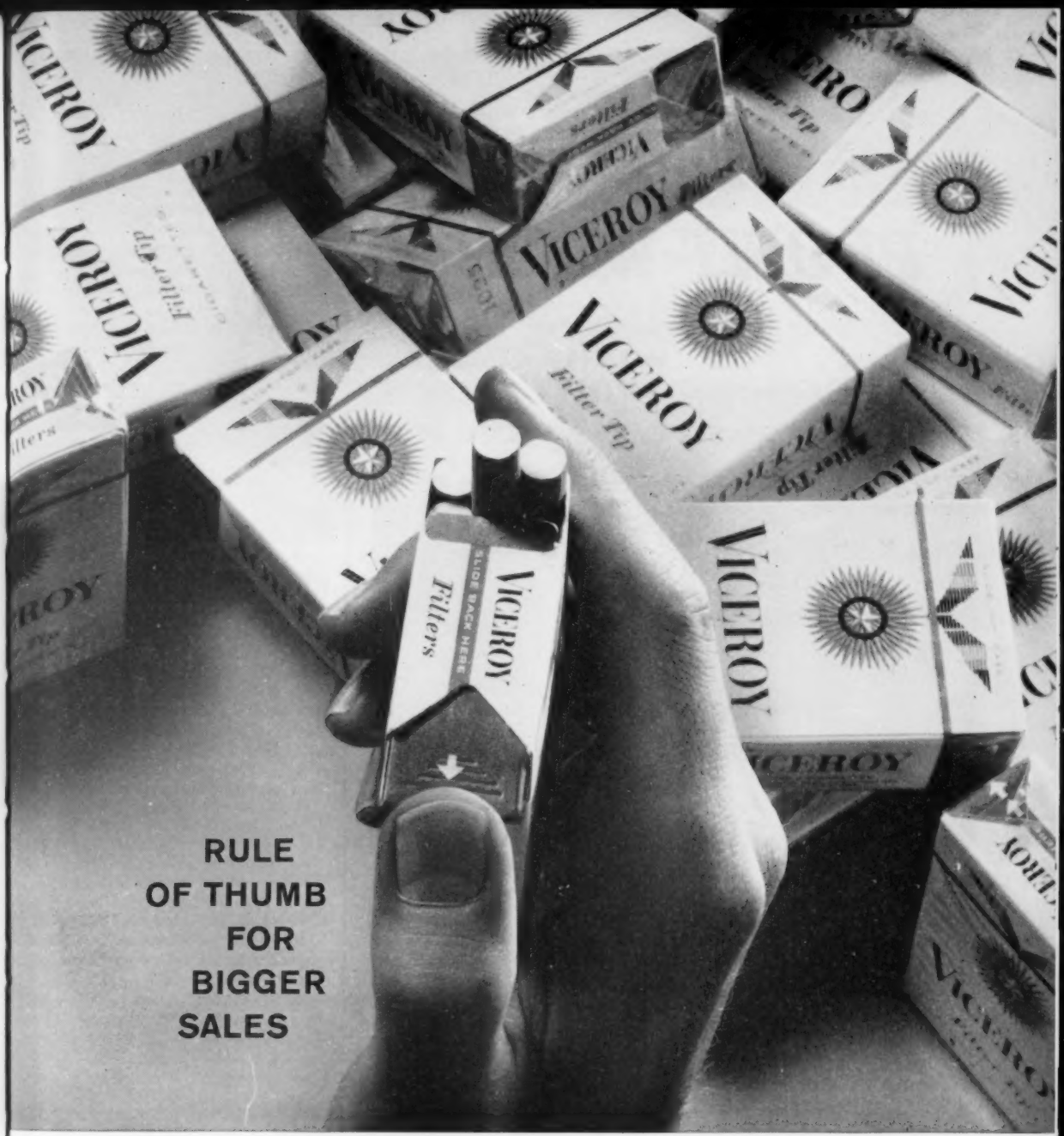

Bend your thumb and the top slides open . . . extend your thumb and the top closes. It's an open and shut case that the new "Slide-Top" case—roto-printed by Marathon on special solid bleached paperboard—helps promote cigarette sales. Here's a good rule of thumb to remember: for packaging that gives your product a promotional plus, call on the experience and resources of your Man from Marathon. Marathon, a Division of American Can Company, Menasha, Wisconsin. In Canada: Marathon Packages Limited, 100 Sterling Road, Toronto 3.

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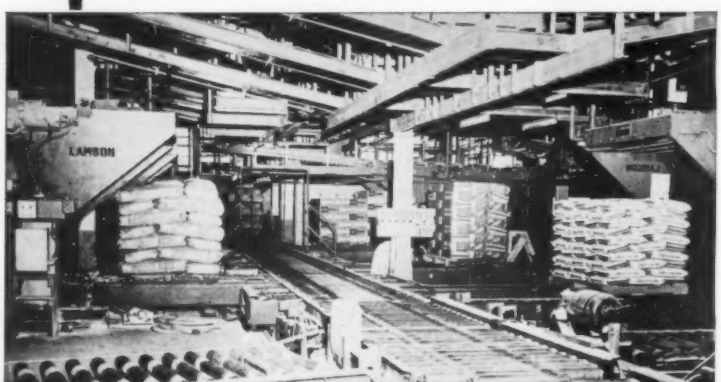

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If you have a materials handling problem, write LAMSON today for our conveyor catalog and the name of your nearest LAMSON Field Engineer. Or, simply clip this advertisement to your letterhead and mail to:

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producer. It expects the new film to bring about economies in packaging military, electronic and other delicate equipment components.

More expansion for packaging:

The boxboard and folding carton division of CONTINENTAL CAN CO. has opened a new district sales office in Cincinnati. Other expansion at Continental includes a 200,000-sq.-ft. fibre drum manufacturing plant in Carteret, N.J. and a 30,000-sq.-ft. metal can manufacturing plant (to be in operation by July, 1961) at St. Joseph, Mo. . . . ARMSTRONG CORK CO.'s expansion and modernization project at its Dunkirk, Ind. glass container plant includes a new glass melting furnace that increases production capacity by 50 per cent. . . . C. H. DEXTER & SONS, INC. has acquired THE CHEMICAL COATINGS CORP. of Rocky Hill, Conn.

A New York City sales office has been established by WEST VIRGINIA PULP AND PAPER's HINDE & DAUCH DIV. . . . ALLIED CHEMICAL's general chemical division will build a plant at Elizabeth, N.J. to produce its fluorinated hydrocarbon refrigerants and aerosol propellants. . . . THE DELAWARE BARREL & DRUM CO.'s $1,000,000 expansion program, to be completed June, 1961, includes the purchase of the PULLMAN CO. plant and five acres of ground in Wilmington, and the opening of a sales office in Los Angeles.

A 60,000-sq.-ft. technical center will be built by ST. REGIS PAPER CO. at Clarkstown, N.Y. . . . ARTHUR COLTON CO. will expand its filling and pharmaceutical machinery and manufacturing plant in Mancelona, Mich. by 30 per cent. . . . By early 1961, NATIONAL CAN CORP. expects its new 200,000-sq.-ft. plant in New Jersey to be producing 2,000,000 cans daily.

AVISUN CORP. plans a 100,000,000 lb./yr. polypropylene plant at New Castle, Del. . . . On 13 acres near Coloma, Mich., AMERICAN CAN CO. will build a 60,000-sq.-ft. warehouse for its Canco Div. . . . GILMAN PAPER CO. has added a third paper machine to its mill at St. Marys, Ga. and has rebuilt its No. 2 machine at its Gilman, Vt. mill.

A new sales office in Charlotte, N.C. will cover the Southeast for AMERICAN VISCOSE CORP.'s industrial packaging department. . . . ST. JOE PAPER CO. has acquired COLUMBIA CONTAINER CORP. of Baltimore, Md. and an affiliate company, COLUMBIA CONTAINER CORP. OF VIRGINIA. . . . Construction has begun on OWENS-ILLINOIS GLASS CO.'s glass container plant in New Orleans.

LUDLOW CORP.'s expenditure program includes $750,000 for expansion at its plastic plant in Homer, La. and its research facilities in Needham Heights,

DU PONT

PACKAGING TRENDS

Data of Interest to Engineers from Du Pont

Overwrap of ALATHON helps cut costs 33%

The Southern Maid Paper Co., of Jacksonville, Fla., has had money-saving success since switching to ALATHON two years ago. As a direct result of using an overwrap film of ALATHON, it has reduced labor costs 33%, and increased sales 50% and production 20%.

The company's school products were previously wrapped with paper bands. But these broke easily and did not prevent soilage. The new, strong overwrap of Du Pont ALATHON completely protects the product during shipping and handling. It also allows a larger number of sheets per package for a popular new economy pack. As W. Wayne Mills, Vice-President of Southern Maid, says, "ALATHON presents an attractive, eye-catching package, increases shelf life and reduces spoilage from handling, dust and yellowing."

ALATHON polyethylene resins are available in a wide variety of formulations to help you develop better packaging. Find out how by mailing in the coupon at right.

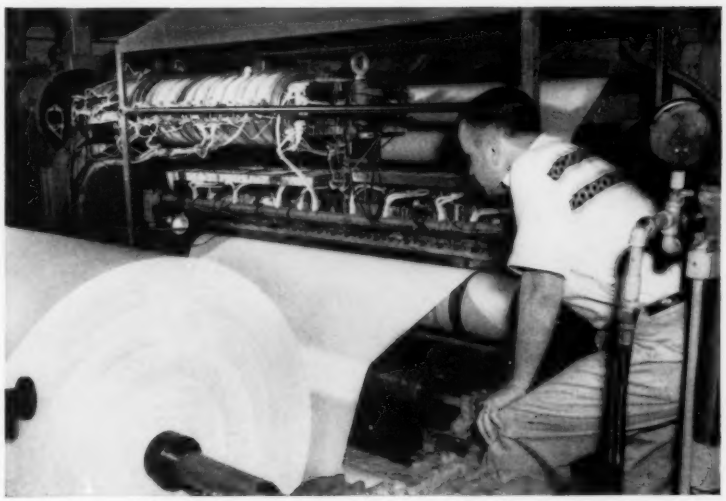
POLYCHEMICALS DEPARTMENT

DU PONT

REG. U.S. PAT. OFF.

Better Things for Better Living ... *through Chemistry*

International Paper switches to ALATHON® ... increases coating speeds



Before changing to coatings of Du Pont ALATHON polyethylene resin, the International Paper Co. of N.Y. used several types of polyethylene for coating their sugar-packet paper. When they switched to ALATHON, they were able to increase over-all production speed while still keeping a fine, uniform coating.

This coating of ALATHON is among the thinnest on the market today. Even in these ultra-thin sections, the uniform quality of ALATHON permits void-free sealing and an extra measure of moisture protection. And since the heat sealing temperature of the ALATHON used in this construction is lower than the polyethylene previously used, the filling machines can be run at higher speeds.

International Paper has found that coatings of ALATHON provide outstanding protection, increase production speeds and lower costs. It may pay *you* to find out how this superior and versatile family of polyethylenes can help you. Fill in and mail the coupon below.

E. I. du Pont de Nemours & Co. (Inc.), Department DD-9
Room 2507A, Nemours Building, Wilmington 98, Delaware

Please send me a copy of "The family of Du Pont ALATHON polyethylene resins for extrusion coating".

*Name*_____ *Position*_____

*Firm Name*_____ *Type of Business*_____

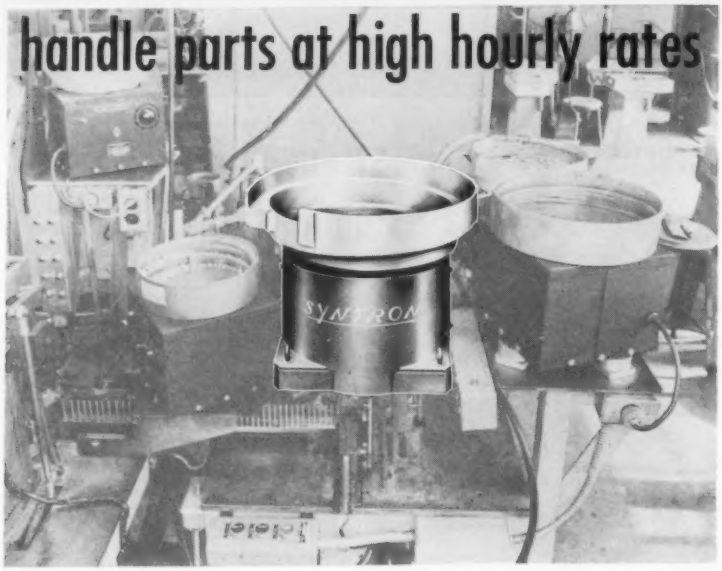
*Street Address*_____

*City*_____ *State*_____

In Canada: Du Pont of Canada Limited, P. O. Box 660, Montreal, Quebec

SYNTRON cost-reducing equipment of proven dependability

handle parts at high hourly rates



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PARTS FEEDERS

. . . replace manual methods of handling small parts . . . handle parts of almost every size, shape and material at high instantly controlled rates to packaging, marking and other operations.

SYNTRON Parts Feeders offer dependable, high count, single file feeding of parts. Designed for efficient, dependable service with little or no maintenance.

Write for free literature on SYNTRON Parts Feeders

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Quality Equipment Since 1921

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Other SYNTRON Equipment of proven dependable Quality

VIBRATORY PACKER & JOLTERS

VIBRATING SCREENS

HOPPER LEVEL SWITCHES

Mass. . . . M & H PACKAGING CO., INC. is being organized into a new corporation to be named DIXIE PACKAGING, INC. . . . CELANESE CORP. OF AMERICA's expansion program at its Pampa, Tex. plant will double that plant's acrylate production.

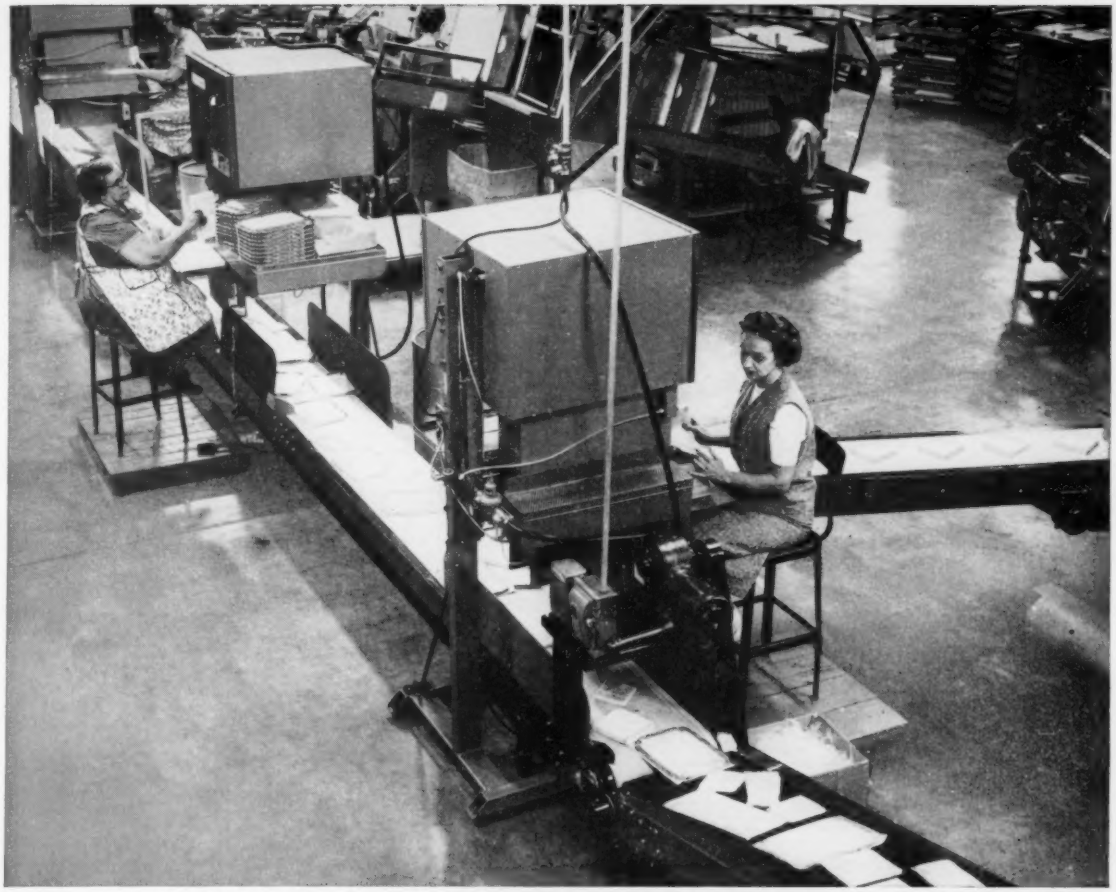
NEW ERA MANUFACTURING CO. will transfer the operations of WETTER NUMBERING MACHINE CO., which it recently acquired, to its new plant in Hawthorne, N.J. . . . The merger of LASSITER CORP. into RIEGEL PAPER CORP. has been approved by each company's board of directors and awaits only the stockholders' approval. . . . HEXCEL PRODUCTS INC. has purchased the assets of APPLIED PLASTICS CO., INC. and will operate it as a division.

Dollars and cents:

For the six months ending June 30, 1960, MINNESOTA MINING AND MANUFACTURING CO. reports sales of $263,013,173 and net income of $32,366,002. For the same 1959 period, sales were $237,358,645 and income, $29,597,074. . . . CROWN ZELLERBACH CORP. reports earnings for 1960's first six months at $20,295,000 (up 5% per cent over the same period last year) and record sales of $275,737,000 (up 7 per cent from 1959's first half.) . . . For the first six months of 1960, REYNOLDS METALS CO.'s net sales totaled $216,114,000 compared with $239,486,000 for the same period in 1959. Net income amounted to $13,218,000 compared with $20,609,000 for the first half of 1959.

First-half net income of PHILLIPS PETROLEUM CO. amounted to $51,747,822 compared with $53,208,794 for first half of 1959. . . . ST. REGIS PAPER CO.'s sales for the first six months of 1960 were $248,027,343 compared with $229,539,810 for the comparable 1959 period. Net income for 1960's first half was $11,755,689 compared with $14,128,369 for the same 1959 period. . . . NATIONAL STARCH AND CHEMICAL CORP.'s sales for the first half of 1960 totaled $27,483,585 compared with 1959's first-half sales of $25,934,001. 1960's first-half income was $1,591,215 compared with 1959's first half $1,550,764.

For the first 24 weeks of 1960, FEDERAL PAPER BOARD CO., INC. reports sales of $39,281,000 and income of $1,842,000. For the similar 1959 period, sales totaled $39,578,000 and income, $2,467,000. . . . THE FLINTKOTE CO., for 1960's first six months, reports sales of $115,355,349 and income of $5,282,171. 1959's totals for the comparable period were: sales, $114,833,213 and income, $7,113,052. . . . DIAMOND NATIONAL CORP.'s earnings for the first half of 1960 ($6,815,000) were 45.3 per cent higher than for the first half of 1959 ($4,691,000). Sales for the same



HOW TO EASE POLYETHYLENE FILM INTO YOUR OVERWRAP PACKAGING OPERATIONS

You can lower your costs and end up with better overwraps by switching your packaging operations to economical polyethylene film. The period of change-over to polyethylene will be smooth, too, if you keep these three simple rules in mind:

OBTAIN THE PROPER EQUIPMENT

Various types of polyethylene-handling equipment and accessories are available from packaging machinery manufacturers and film suppliers. The different heat-sealing and temperature control systems, in particular, should be thoroughly investigated, since these are generally the most critical features of equipment or adapters. And take advantage of the help you can receive from U.S.I. packaging and instrument and control engineers in selecting the equipment you need. Because our experts work closely with machinery makers, they are able to answer your questions and help you solve problems.

MAINTAIN SPECIFIED FILM GAUGE

For proper sealing, the thickness of the film must be uniform because this affects heat transfer. The way to guarantee uniform thickness is to set up realistic film gauge variation specifications for your packaging operation. Then make sure your supplier meets these specs.

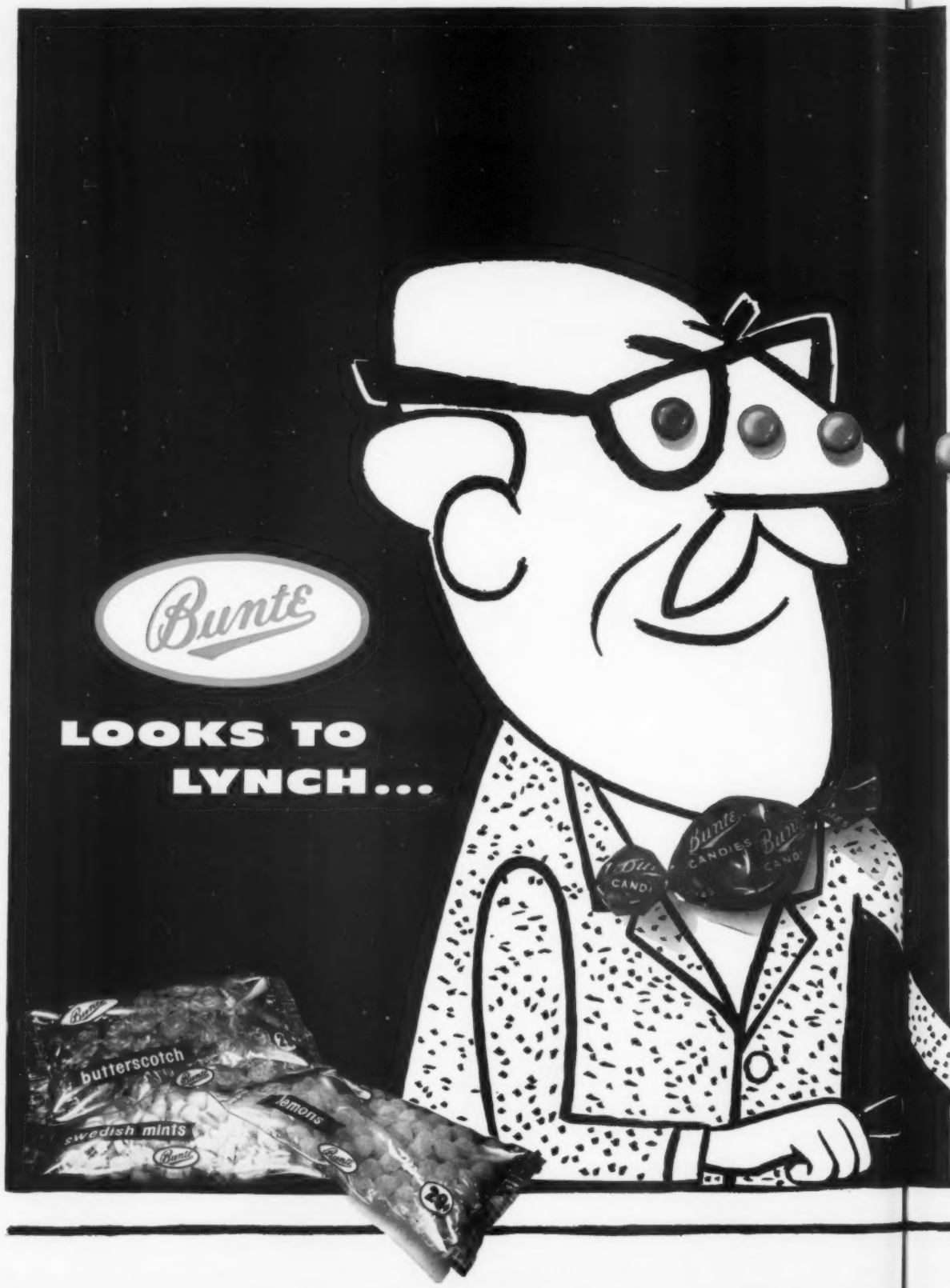
In general the best type of film to use in overwrap applications is *cast* polyethylene film. It has a more positive gauge control during manufacture, and it has exceptional clarity—an important advantage in most overwrap packaging. U.S.I. supplies PETROTHENE® polyethylene resins which are ideal for making *cast* film.

TRAIN OPERATING PERSONNEL

Any initial change-over problems can be greatly eased by proper training and supervision of operators. Many machinery manufacturers and film suppliers will show operators how to get best performance from both machinery and film. U.S.I., too, will be glad to advise on any technical or training problems that may arise.

Wherever these three points have been followed, polyethylene film has delivered its full promise—a more economical, more saleable package for baked goods, paper, candy, and many other products. If you'd like the advice or aid of U.S.I. in making the most of polyethylene in overwrap machinery, write to:

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities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LOOKS TO
LYNCH...
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CANDIES
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CANDI

Now 28 Bunte candies go to supermarket from one automated Lynch packaging system

Up to 25% more production and a new low in changeover time. These are two of the important advantages Bunte gets from their switch to the versatile, flexible Lynch system. An unequaled volume of bulk and pre-wrapped candies flow automatically through the integrated Lynch Robo-Lift and weighing system to bags formed, filled and sealed by Robo-Wrap at a rate 25% faster than most competitive machines.

Bunte reports weighing accuracy at an all-time high, down-time and rejects at an all-time low.

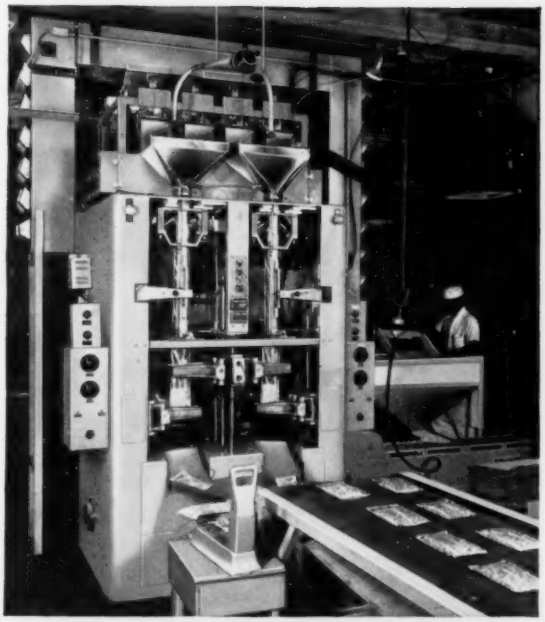
For their jelly candies Bunte has ordered another automated Lynch system. It automatically sifts out excess sugar—and excess packaging costs.

Talk with Lynch engineers for a complete analysis of your packaging needs—without obligation.

ROBO-LIFT is completely integrated with all other handling and packaging units in the Lynch automated system, to vertically lift or horizontally convey powders, solids, granules—almost anything that flows—gently and undisturbed.

ROBO-WRAP exclusive hand-over-hand action increases production, cuts stop time; forms, fills and seals up to 240 pillow-type single or double wall packages per minute with face-to-face or overlap seam seal. Lower drive speeds, far less stress on materials, reduced machine wear. Uses almost all materials.

LYNCH WEY-MOR scales are specially designed for speed and accuracy in handling a wide range of weights and products.



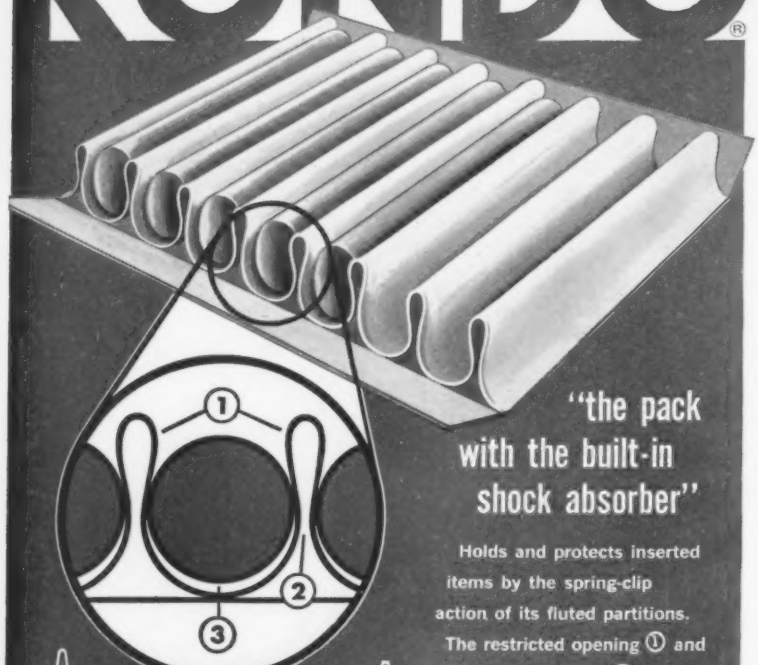
LYNCH
CORPORATION
Anderson, Indiana

LEADERS LOOK TO LYNCH—
FOR MACHINES THAT PACKAGE ALMOST EVERYTHING

Manufacturing Engineers of automatic processing equipment in the glass, packaging, plastic and other industries.

ATLANTA • CHICAGO • SAN FRANCISCO • ENGLEWOOD, N. J.

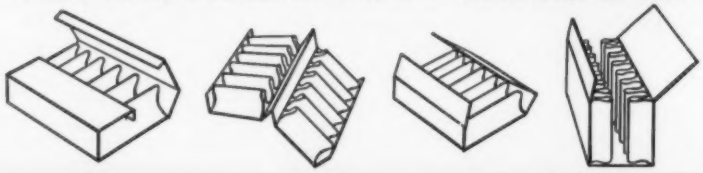
RONDO®



"the pack with the built-in shock absorber"

Holds and protects inserted items by the spring-clip action of its fluted partitions. The restricted opening ① and the spaces between ② and beneath ③ are the basic elements of this package that assures safe conveyance and efficient handling. Applications available for many articles of various industries in the medical, cosmetic, electronic, tool, art supply and other fields. Generally for cylindrical or other simple profiles from 3/16" to 1 1/4" in diameter. A Paper Product, Sold at Paper Prices.

SOME OF THE MANY **RONDO** STYLES TO FIT INDIVIDUAL REQUIREMENTS



RONDO process and designs patented in all major countries. Write for information.

RONDO OF AMERICA, INC.
100P SANFORD STREET, HAMDEN 14, CONN.

period rose 7.6 per cent—from $103,554,000 in 1959 to $111,467,000.

What people are doing:

The school of packaging of Michigan State University has promoted DR. JAMES W. GOFF to the rank of full professor, the first full professorship in the packaging field. . . . MARK K. DRESDEN, former president of A. H. Wirz, Inc., has joined the management consultant staff of Day & Zimmermann.

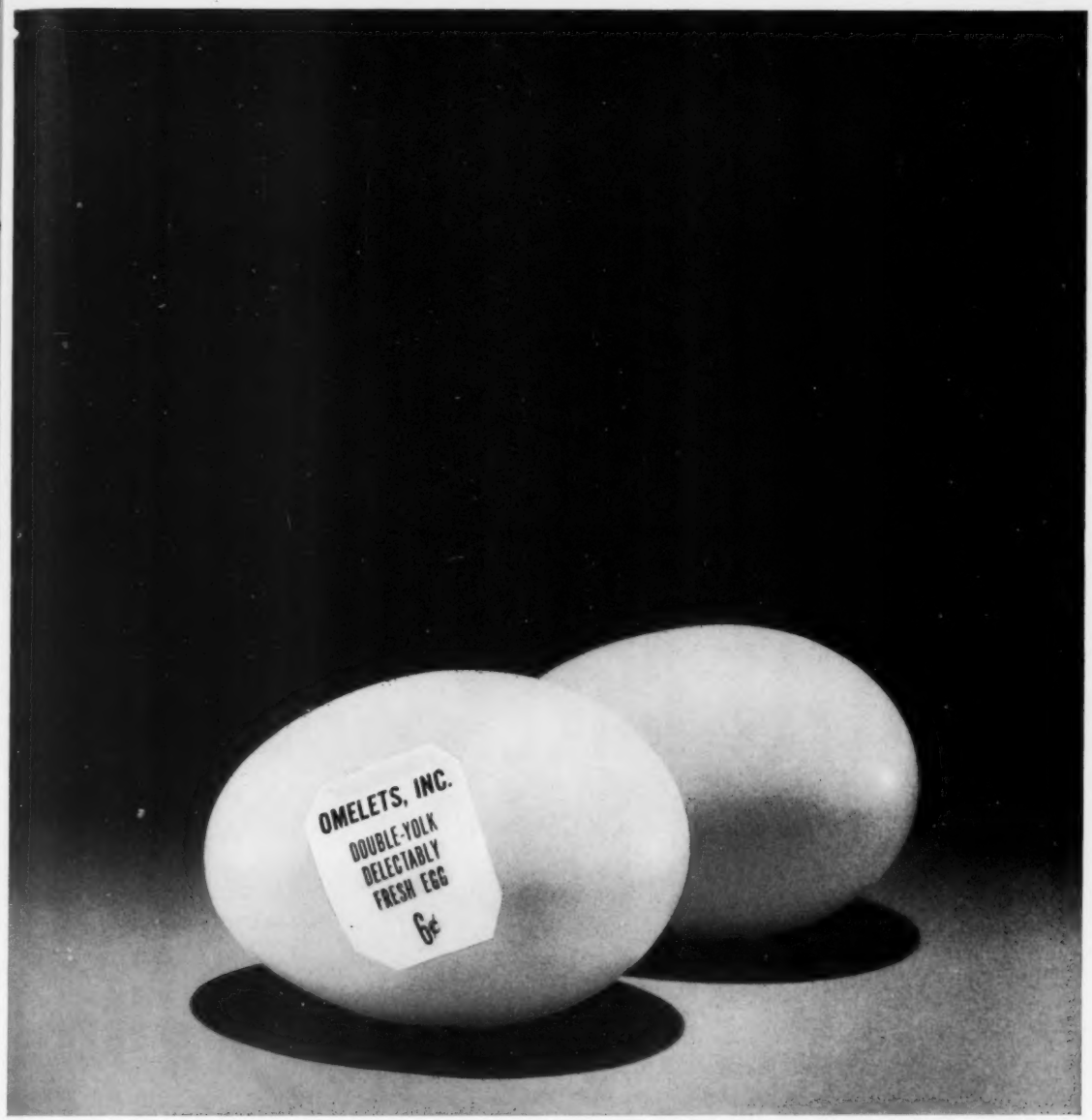
EDWARD A. BRANSKI is now manager of IMCO Container Corp.'s new Goleta, Calif. plant. . . . U.S. Industrial Chemicals Co. has promoted two former assistant polymer service laboratory managers to managers—WILLIAM F. McDONALD, customer services, and GERALD M. PLATZ, plant services. . . . JACK DICKER is now general sales manager of Aircraft Dynamics International Corp.'s newly-formed packaging and freight division. . . . Plax Corp. has promoted JOHN J. BARILE to sales manager of the Cincinnati office and ROBERT C. ROSE to assistant district sales manager, New York. Joining Plax are JOHN W. SCHMID as advertising and sales promotion manager, and RALPH H. SMITH as sales manager, plastic cartons.

Director of budgetary control at Columbia Box Board Mills, Inc. is now GEORGE HOOVER III. . . . JAMES A. COMMINS has been appointed product manager of Atronic Products, Inc. . . . The McKay Co. has elected ALBERT J. SMITH as vice president.

HARRY P. McNAUGHTON, comptroller, Crown Cork International Corp., and PAUL C. NAGEL, JR., vice president of finance and planning, Milprint, Inc., have been elected to membership in the Controllers Institute of America. . . . Two promotions in the sales organization of Arthur Colton Co. are ARTHUR PEARCE, sales engineer, eastern branch office, and ROBERT CLARK, director of customer service. . . . Container Corp. of America has named L. N. GOLDMANN as sales manager of its Santa Clara, Calif. folding carton plant and HARRY F. DRNEC Chicago district sales manager for solid fiber operations.

Eastern regional packaging sales manager for Reynolds Metals Co. is LAWRENCE G. SCHNAUZ. . . . NORMAN DONOVAN was named assistant to director of planning of The Kordite Co.

Milwaukee district manager for Crown Cork & Seal Co., Inc. is CHARLES L. THOMAS. . . . Fibreboard Paper Products Corp. has named LEONARD A. CAREY merchandising manager for distributor and non-food consumer packaging. . . . J. ROBERT VON BARGEN is now assistant eastern regional manager of Corn Products Div. CLEO MIKEL replaces him as district manager at Buffalo. *(End)*



There isn't a package in the world that doesn't need a selling label

Two potential omelets—each in the most perfect package ever designed—yet which will sell first? The egg of unknown age, price and content or the one the consumer *knows* holds twice the goodness, fresh from the hennery, for only 6¢?
Soabar adds "selling pluses" like this to any package: with versatile marking equipment, geared to the speed of modern production and the varying requirements of today's diversification, with *flexible marking methods* that permit *split-second* imprint changes of your different information, with Soabar roll tickets and labels tailored to meet your individual needs for Identification, Content, Pricing, Shipping and Stock Control.
Now, in your own plant, you can imprint selling labels to suit your packaging rapidly, efficiently, economically, without skilled operators or costly inventories of pre-printed labels.

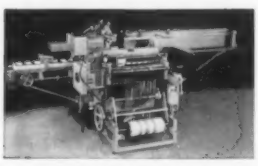
Soabar company

Specialists in Marking Equipment and Roll Tickets and Labels Since 1912

Soabar, 5812 Walker Street • Philadelphia 24, Pa.—In Canada distributed by The Jonergin Co., Inc. and W. J. Westaway Company, Limited.

IF ANY OPERATION IN YOUR PLANT CALLS FOR HIGH-SPEED, AUTOMATIC OVERWRAPPING...

BATTLE CREEK MACHINES CAN PROBABLY DO IT BETTER, FASTER, MORE ECONOMICALLY THAN ANY OTHER



Display dominance and product protection are essential in the mass merchandising of textile products. The Model 475 satisfies these requirements and overwraps such products as briefs, T-shirts, handkerchiefs, pillow cases, socks in any of 40 different heat sealing film formulations. It allows current film economies and anticipates the opportunity to handle heat sealing films still to be developed. Such versatility is a decided competitive advantage to manufacturers. The Model 475 weld-seals wraps up to 75 per minute within 5" to 12" lengths, 3" to 8½" widths and ¼" to 4" heights. Write for full details today.

Continuous Flow® PACKAGING

BATTLE CREEK *packaging machines, inc.*, BATTLE CREEK, MICH.

For more information circle No. 213 on Reader Service Card

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INTERNATIONAL PAPER—The Ultimate Source

How to improve a 35-year-old paper

(More packaging news from International Paper)

Read about our Gator-Hide® kraft paper line and new bleached Gator-Hide Extensible Kraft.

The reputation of Gator-Hide, the world's most widely used kraft paper, began when International Paper made its first roll of kraft paper in the South in 1925.

Today, in our Southern mills and research centers, a second and third generation of craftsmen are still finding new uses for this Gator-Hide line of strong protective packaging paper.

One of the most valuable recent additions is *bleached* Gator-Hide Extensible Kraft. This paper provides built-in *stretch* for *extra strength*. It is ideal for industrial wrappings, multiwall bags and many other uses. Comes in white, black and natural color.

Our craftsmen are also producing many different specialty papers. Papers that can be made water repellent, highly absorbent and flame resistant. Poly-coated, waxed and colored specialty papers are also available.

The future of Gator-Hide industrial papers is unlimited. Their versatility will contribute to the science of packaging for years to come.

International Paper can provide you with the widest range of papers, boards and packaging assistance in the industry. Call us or contact your converter—he's probably been doing business with us for years.

INTERNATIONAL PAPER New York 17, N. Y.

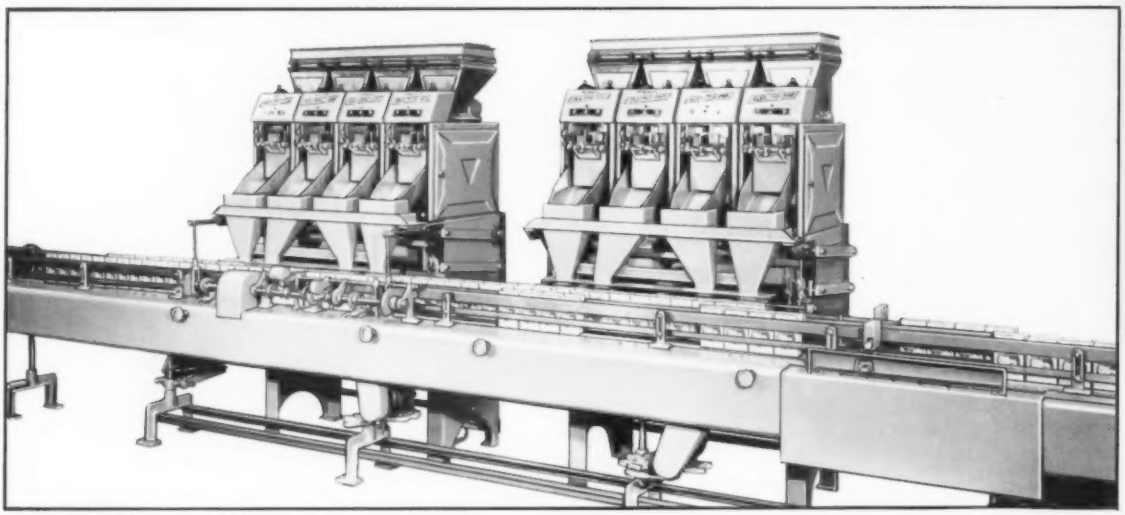
Manufacturers of papers for magazines, books and newspapers • papers for home and office use • converting papers • papers and paperboards for packaging • shipping containers • folding cartons • milk containers • multiwall bags • grocery and specialty bags and sacks • pulps for industry • lumber, plywood and other building materials

What Does It Take To Build Automatic Packaging Machinery?

Obviously, the engineering development of any fully automatic packaging installation is a complex matter. Any good engineer can design a custom machine that will do the job one way or another. However, the problems presented by actual production conditions need the simplest, most economical solution. The machine that best solves the problems is always a combination of proven automatic packaging techniques and experience. In other words, a fitting of perfected methods into your plant operations.

That "fitting" is often the only difference between uneducated iron, and an automatic packaging system that really pays off.

HOW DO YOU KNOW *WHOSE* AUTOMATIC PACKAGING MACHINE YOU SHOULD HAVE?



Regardless of what form the machine itself takes, the success of its operation in *your* plant depends on two basic factors—the talent and experience of the machine manufacturer to fit your requirements . . . and the proven automatic units that he combines into a machine.

First, let's consider the units or "proven concepts" he has developed in the years of his experience. And, for the sake of example, take the machine shown above that packages a nationally known brand of baby cereal:

The machine must be capable of continuous high speed operation under the toughest plant conditions. It must operate with the least possible attention.

This Triangle Automatic Machine Delivers 120 Packages Per Minute And Is Capable Of More . . . Truly Automatic—Week After Week, Month After Month And Year After Year.

The machine must be accurate. It must deliver packages filled to as precisely the right amount as possible.

This Triangle Automatic Machine Uses Elec-Tri-Pack Net Weighing Scales That Are Sensitive To 1/32 Oz. Or A Single Piece.

Triangle's 37 years of automatic packaging experience is the other factor in the success of this baby cereal packaging machine.

It has given Triangle the ability to provide any type of feed from floor to overhead for handling dog biscuits or powdered dry milk. Furthermore, the Triangle machines are properly synchronized with other plant processing operations.

Triangle *is* a specialist in the business of fully automatic packaging machines. Many high volume packagers of a wide variety of products (names on request) depend on Triangle equipment.

The next time you're considering machinery of this type, ask the location of other Triangle installations, and see the facts for yourself.

37 YEARS

•••••••YOU REALLY SAVE WITH•••••••

TRIANGLE
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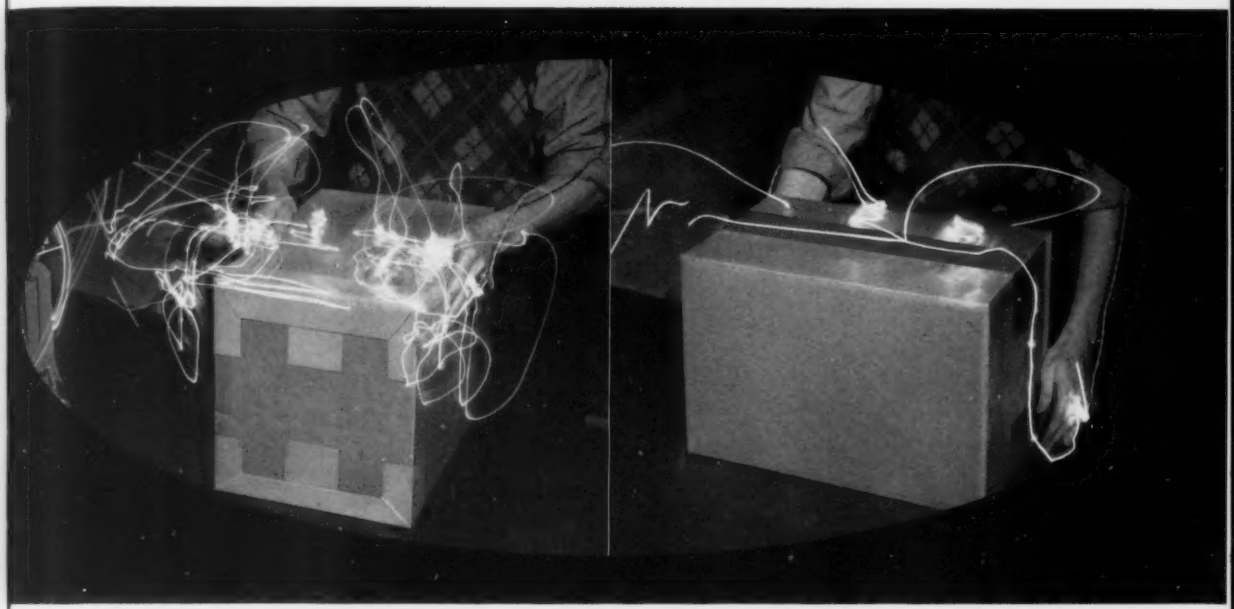
The Ludlow Method
2-STRIP CASE SEALING
FASTER – STRONGER – COSTS LESS



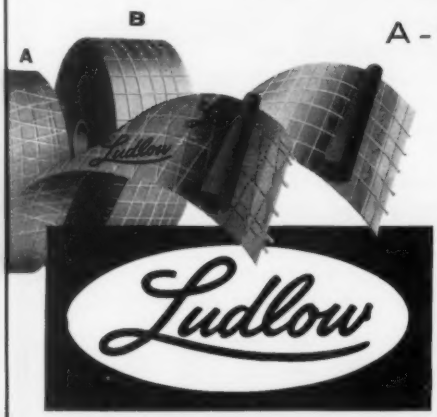
OLD WAY (38.5 Seconds) White lines show actual motions required for sealing *just the top* of a container with plain paper tape.

LUDLOW METHOD (11 Seconds) The same job is done in a single motion. And tough multi-directional fibre reinforcements make closures nearly 3 times as strong.

The tapes that broke the six-strip habit!

Ludlow's reinforced tapes, SNAKETAPE and GLASPUN, are so strong that only two strips are required to seal your cartons instead of the six strips required when plain paper tapes are used. This faster, stronger center seam closure method actually reduces your tape application costs by 66%. Both SNAKETAPE and GLASPUN are approved for shipment on all carriers, including railroads under U.F.C. Rule 41.

Be sure to specify *Ludlow* reinforced tapes — either glass-reinforced GLASPUN, or world-famous SNAKETAPE, the *only* reinforced tape with rayon reinforcement. The Ludlow name is your best assurance of uniform quality and dependability.



A - **SNAKETAPE®** Rayon-Reinforced

B - **GLASPUN®** Glass-Reinforced

LUDLOW PAPERS • Needham Heights, Mass. • Dept. 172

Please send me more information on the Ludlow 2-Strip Sealing Method. I am now using ☐ Staples ☐ Wire Stitching ☐ Plain Paper Tape

*Name*_____ *Position*_____

*Company*_____

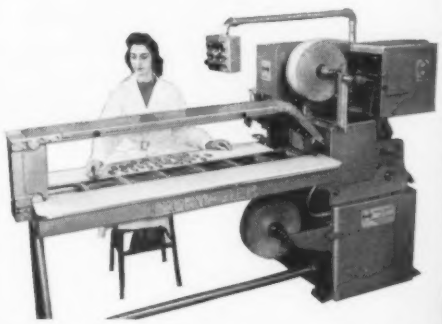
*Street*_____

*City*_____ *Zone*____ *State*_____

VPI-Coated Papers • Greaseproof Papers • Waterproof Papers • Poly-Coated Papers • Gummed Tapes • Federal Spec. Papers • Label & Specialty Papers • Plastics

New Sundstrand "Packmasters" with built-in versatility lower packaging costs

Small runs or big runs! Soft or hard goods! Odd-shaped parts! Wide ranges of size! No matter what your requirements, Sundstrand design makes these versatile Packmasters completely adaptable to your particular needs.



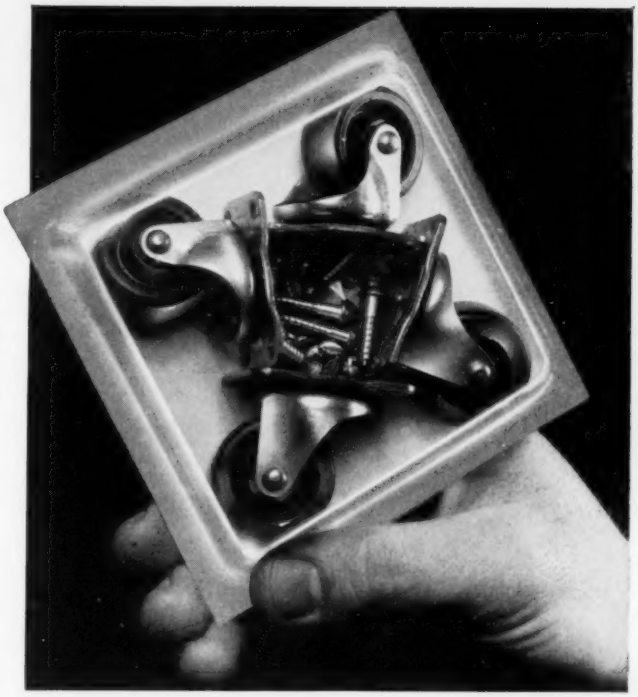
Sundstrand Model 50A Packmaster automatically packages hard or soft goods at rates up to 150 per minute.

Here's the machine that will package an unlimited variety of hard or soft goods in heat-sealable foils, films, or paper. It's designed to handle one or many pieces to a package with transparent or opaque on both sides or transparent on one side, opaque on the other — in size ranges from 2″ to 8″ wide and from 8″ to 16″ long (special sizes to 16″ x 16″). Rates up to 150 packages per minute are possible depending upon size, items to be packaged and packaging material. Change-over for various size packages is easily made in 10 to 15 minutes. For all the facts write for Bulletin 50A-1.

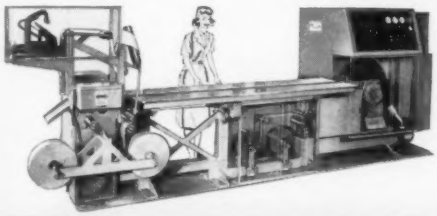
MARK OF SUNDSTRAND RELY-ABILITY

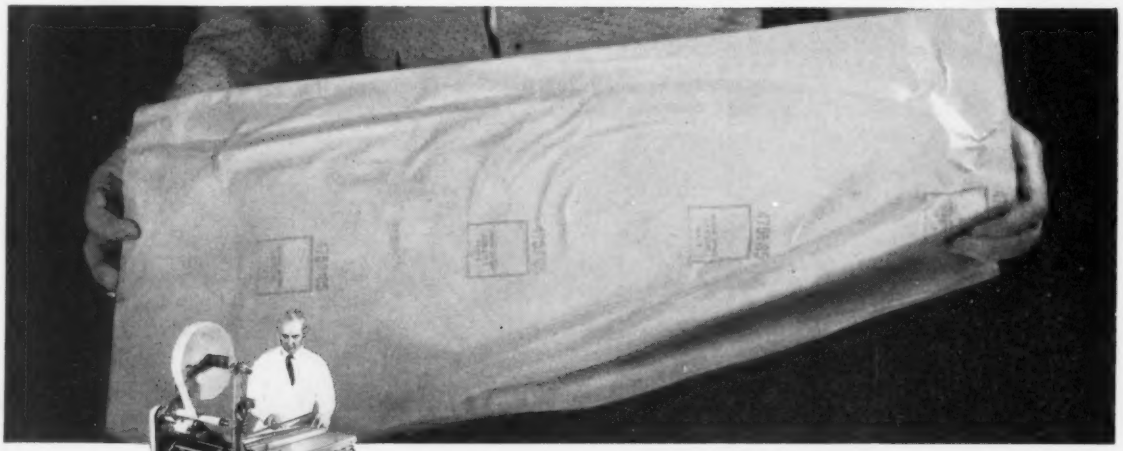
SUNDSTRAND

Attractive butyrate or acetate film blister packages are produced on this new Sundstrand Packmaster. It can run heat-sealed blister packs in sizes to 6″ x 6″ x 13¼″ in regular or irregular shapes at rates up to 126 per min. (3″ x 3″ pack.) Instead of conventional die changeovers, a completely interchangeable drum assembly for each different type package is used. The critical vacuum-draw of each drum is factory engineered for the specific die, insuring blisters of perfect transparency right out to the corner. Entire drum assembly change-over takes only five minutes. Ask for Bulletin 58-1.



Sundstrand Model 58 Packmaster produces crystal-clear blister packages to protect and attractively display your products.

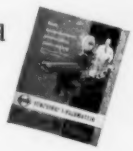




Sundstrand Model 56 Packmaster seals irregular-shaped pieces, protects them from abrasion and rough handling.

Cohesive paper up to 12″ wide is used by this Model 56 Packmaster to wrap irregular-shaped pieces such as moldings, body trim, telephone cases, and extrusions. Thickness can vary as much as from ¼″ to 2″-pieces can have considerable curvature, or random lengths.

Pieces are tightly sealed and effectively cushioned against abrasion and rough handling.
Write for Bulletin 56-1.



AMERICAN BROACH

ANN ARBOR, MICHIGAN • Division of SUNDSTRAND CORPORATION

3M presents...
creative packaging ideas
by distinguished designers

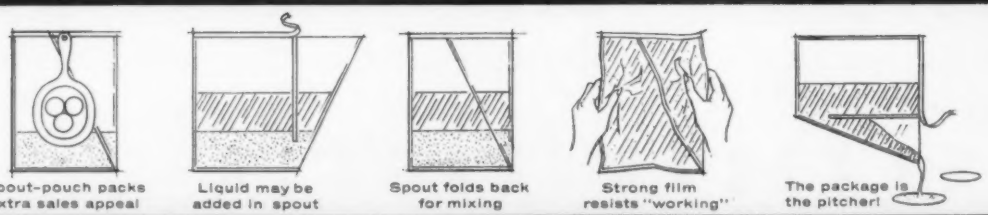
Saul Bass & Associates design in 'Scotchpak'

A spout-pouch in "Scotchpak" Polyester Film. Simply tear open spout, then mix ingredients with base product and liquid. Design adds convenience to everything from pancake mix to chemicals. "Scotchpak" film gives high strength, high chemical resistance, a heat-seal stronger than the film itself. ■ Looking for a new design? Try "Scotchpak"—the film of the future for new design ideas **today**. Write Film Products Group, 3M Co., 900 Bush Avenue, St. Paul 6, Minnesota—Dept. CAS-90

MINNESOTA MINING AND MANUFACTURING COMPANY... *Where research is the key to tomorrow*

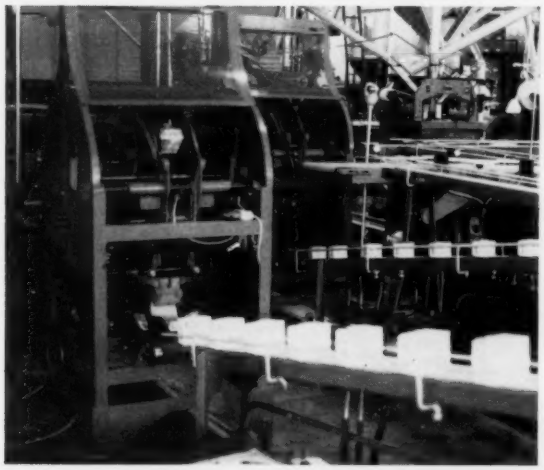
3M COMPANY

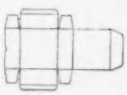
©1960, 3M CO.; "SCOTCHPAK" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.


Spout-pouch packs extra sales appeal
Liquid may be added in spout
Spout folds back for mixing
Strong film resists "working"
The package is the pitcher!

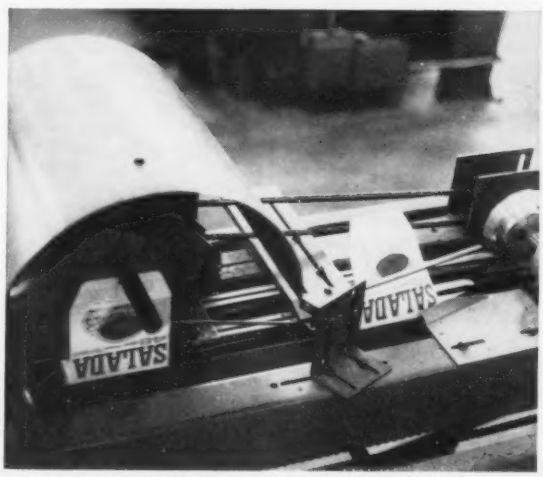
How Integrated PACKAGE Line Speeded Package Design Changeover at Salada

1. **NEW PACKAGE.** A change in package design and a move into what has been called the most modern and efficient tea blending and packaging operation in North America was the beginning of a cost reducing and tremendously successful packaging operation for Salada-Shirriff-Horsey in Woburn, Massachusetts. Utmost efficiency was obtained by using three PACKAGE machines in this modern approach to high-speed packaging.

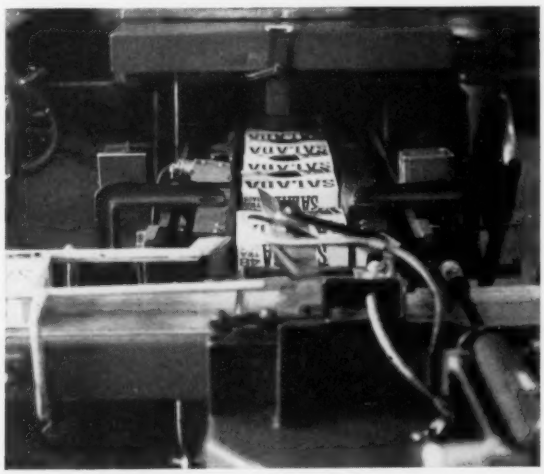


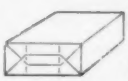


2. **CARTON FORMING.** Flat die-cut blanks, that take up 85% less storage space than the old, pre-formed cartons, are used with two Package PA continuous motion carton forming machines. Completely automatic, the PA sets up the new flip top carton at speeds of 80 to 100 a minute and then drops them on a conveyor belt to the packing line.



3. **CARTON CLOSING.** Filled with tea bags the open cartons are fed into a Package PC Carton Closer. The carton is then automatically closed and passed on to the next operation. As are all Package machines, the PC is easily adjusted to take all the carton sizes used by Salada. The closed carton then goes into a Package FA overwrapping machine.





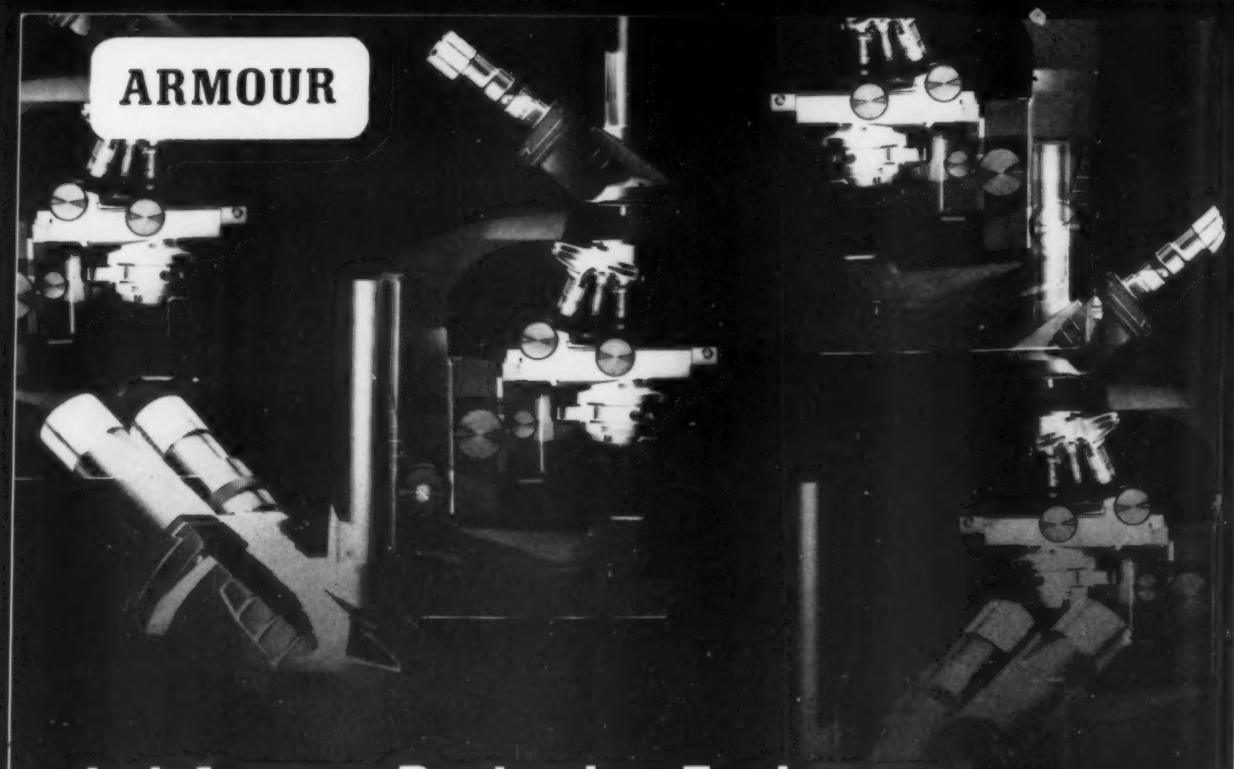
4. **WRAPPING.** Here the boxes have been overwrapped in cellophane on the FA and are ready for market. No matter what type of packaging operation you have, your Package Sales Representative can show you how to do it better with an integrated line by Package Machinery . . . designed to work together for fast, efficient, automatic packaging.

PACKAGING IS PART OF YOUR PROFIT PICTURE

PACKAGE MACHINERY COMPANY, EAST LONGMEADOW, MASS.

NEW YORK • PHILADELPHIA • ATLANTA • BOSTON • CLEVELAND • CHICAGO • KANSAS CITY
DALLAS • DENVER • LOS ANGELES • SAN FRANCISCO • SEATTLE • TORONTO • MEXICO CITY

PACKAGE



Let Armour Packaging Engineers custom-cushion your product with Hairflex!

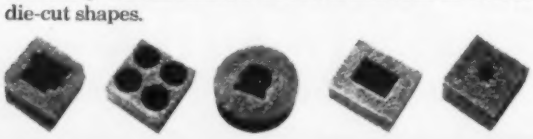
When the value and fragility of your product demands maximum protection, turn the cushioning problem over to an Armour Packaging Engineer.

He'll study the product requirements, shipping, handling and environmental hazards, make a recommendation that will assure safe, out-of-package delivery, and at the same time, cut the weight and volume of your dunnage.

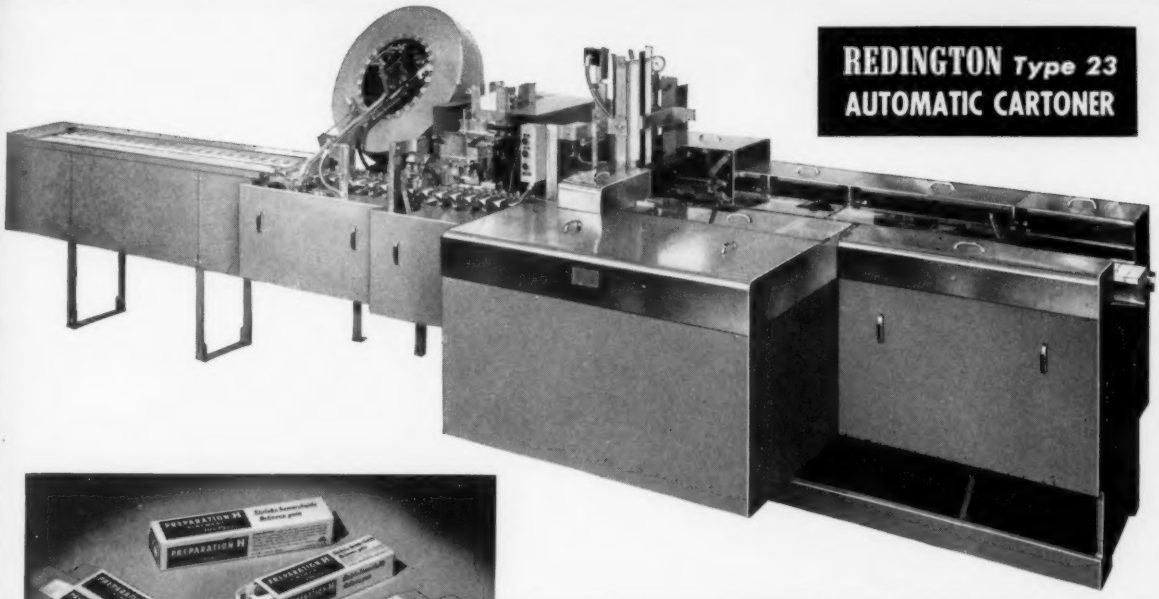
With Hairflex cushioning, you'll get the added advantages of faster, easier packaging on the line, and a completely re-usable cushioning material that pays for itself.

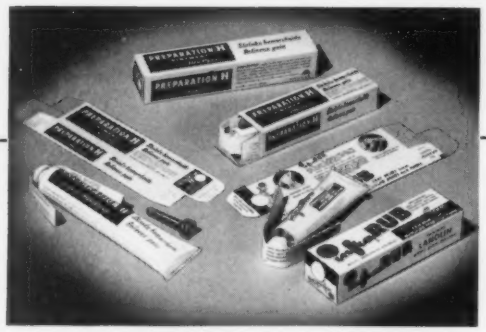
Armour custom-cushioning service is fast because Armour has the facilities and locations to meet your requirements in a matter of days. Call your Armour man for detailed information, or write the factory direct. No obligation, of course. Cushioning Products Division, 16123 Armour Street, N.E., Alliance, Ohio; 2001 Saybrook Avenue, Los Angeles, California.

Armour Hairflex pillows your product in thousands of minute hair coils vulcanized into one unit. Hairflex is moisture and fungus resistant, dust-free, and maintains its shock resistance in temperatures as low as –45°F. Armour produces Hairflex in sheets and rolls as well as die-cut shapes.



ARMOUR ALLIANCE INDUSTRIES





AUTOMATIC CARTONING CUTS LABOR COSTS...

Once tubes have been placed in conveyor pockets, the REDINGTON Type 23 handles all the rest of the packaging job automatically. An unfolded leaflet is fed from the magazine, folded three times parallel to the long dimension, then placed in the conveyor pocket over the top of the filled tube as it reaches the loading point. For "Preparation H," a special mechanism also feeds one pile pipe to each conveyor pocket.

Next, the REDINGTON feeds and forms a carton from the flat stack in the magazine, and inserts the whole assembly from the conveyor pocket; then it tucks in the end flaps to close the carton, and discharges it to packing table or conveyor.

It's highly important that no package of "Preparation H" reach the market without its accompanying pile pipe. A special REDINGTON device stops the machine should a pipe fail to feed to a unit assembly. Another detector prevents feeding a carton to any empty conveyor pocket.

SEND FOR THIS 44-PAGE ILLUSTRATED CATALOG

which describes many interesting machines for cartoning, wrapping and special packaging all kinds of products in many fields.

Different products... different sizes... different enclosures... all automatically cartoned with *one* REDINGTON!

Many lines—perhaps *your* line—include different package sizes, and different groups of articles which must be cartoned. But this doesn't mean that you can't have the production-boosting, cost-reducing advantages of *fully automatic cartoning*—not if you have the right REDINGTON working for you.

The machine illustrated is an excellent example of what we mean. Whitehall Laboratories Inc., Elkhart, Indiana, require large volume production on two different cartoned products. On one line, their "Preparation H" ointment is cartoned in 1 oz. and 2 oz. sizes, "Infra Rub" in a 1½ oz. package. Both products are packaged in tubes, accompanied by leaflets; "Preparation H" cartons also include plastic pile pipes.

This means plenty of variables to contend with—yet Whitehall's REDINGTON Type 23 permits *fully automatic cartoning* of all items on this one machine, with production speeds up to 150 packages a minute! What's more, changeover of the machine for the different carton sizes or from one item to the other is simple, and reqtires minimum downtime.

Whatever *you* package in cartons—and whatever variations *your* line includes—it will pay you to get the facts about the advantages REDINGTON Automatic Cartoning offers you in terms of steady, volume production with a minimum of direct labor cost. For more than six decades, REDINGTONS have been giving profitable, high-efficiency performance to packagers—both large and small—in many lines. They are built to exacting specifications, with never a compromise on materials or workmanship, to assure a long productive life even under hard-use conditions.

Why not call in experienced REDINGTON engineers *now*, to discuss how you can get better, more profitable package production?

F. B. REDINGTON CO.
3022 ST. CHARLES ROAD, BELLWOOD, ILLINOIS • Chicago Phone:—AUstin 7-4200
Verona, New Jersey . . CEnter 9-4608

REDINGTON
AUTOMATIC MACHINES for CARTONING WRAPPING • SPECIAL PACKAGING

▲ Alcoa Foil Packaging ideas for every need . . .

Alcoa Foil Portion-Packs give new single-service convenience

Customers are delighted by this new timesaving handiness. They like the new moneysaving advantages, too—no leftovers thrown out, no loss from staleness or spoilage.

Does your product need protection? These semirigid aluminum containers resist crushing. Seal hermetically. Yet open with an easy pull.

Where can you use them? For *any* portion-served item—from mustard, catsup, mayonnaise . . . to sundae-toppings, pancake syrups. Put cup-size amounts of instant coffee in them. Or detergents, premeasured for washer loads. Those are just a few possibilities.

For portion-packs adapted to your product, or for special custom-tailored aluminum packaging of any kind, call or write ALUMINUM COMPANY OF AMERICA, 1657-J Alcoa Building, Pittsburgh 19, Pa.

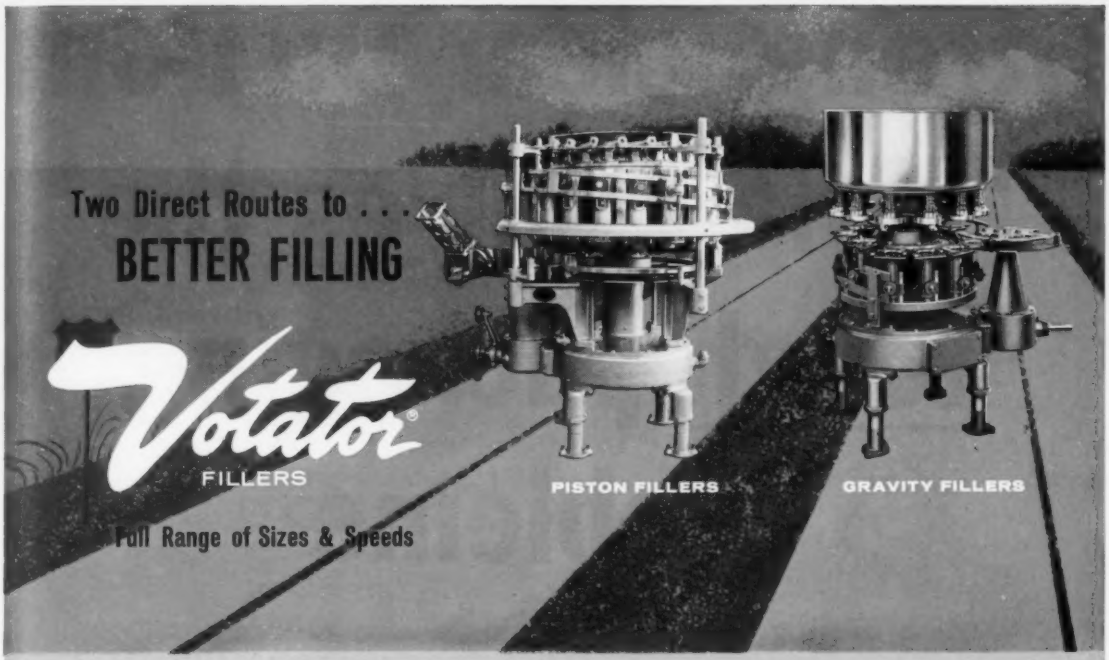
Better Packaging

ALCOA ALUMINUM

FOIL PACKAGES

Make Alcoa your Idea-center for better

Overwraps • Package structures • Pouches • Multiwall bags Jungle wraps • Closures • Rigid containers • Laminates • Printing primers • Inks • Dyes • Adhesives • Lacquers • Coatings



VOTATOR rotary piston fillers offer specific advantages, such as greater rigidity with *four point* suspension—thus greater accuracy, self-cleaning valve seats, fine micrometer adjustment *even while in operation*, and easy accessibility of valve guides, ports and rollers. Large diameter Nylon piston and valve rollers reduce wear. In addition, VOTATOR piston fillers feature high-speed no-container, no-fill mechanism, a fully enclosed gear case, adjustable legs, and a wide variety of valve sizes.

VOTATOR gravity fillers are designed for filling liquids having free flowing characteristics. Special seal pads at the base of the valve assembly make a tight seal possible even if top flange of container is not perfect. Extra large valves reduce foaming and increase accuracy. Extra long valve sleeves provide smoother operation, reduce leakage and prevent sticking. Changes for different size containers are quick and easy. Adjustable legs, fully enclosed gear case, a variety of valve sizes and Nylon lifter rollers are more features of VOTATOR gravity fillers.

ROTARY PISTON FILLERS

Model No.*	P6L	P9L	P12L	P18	P18L	P27	P27L	P36	P36L	P6G	P9G
Max. Capacity of Fill (oz.)	40	40	40	20	40	20	40	20	40	160	160
Max. Container Dia.	404	404	404	303	404	303	404	303	404	610	610

GRAVITY FILLERS

Model No.*	G6L	G9L	G12L	G18	G18L	G27	G27L	G36	G36L	G6G	G9G
Max. Capacity of Fill (oz.)	48	48	48	32	48	32	48	32	48	128	128
Max. Container Dia.	404	404	404	303	404	303	404	303	404	603	603

*Model denotes number of stations

Let us show you which is best for you

VOTATOR Fillers are designed to provide accuracy and speed throughout all practical production ranges and container sizes.

In both the piston and gravity types, ranging from 6 through 36 stations, smoothness of operation, ease of integration with associated equipment, rugged, trouble-free construction, and expert know-how and service on each individual installation assure top packaging performance and economy.

Write or call for additional specific information. Bulletins describing both piston and gravity fillers are available upon request. There is no obligation.

® T. M. Reg. U. S. Pat. Off.

GIRDLER PROCESS EQUIPMENT DIVISION
CHEMETRON CORPORATION
Louisville 1, Kentucky

CHEMETRON

Sales Offices: Louisville • New York
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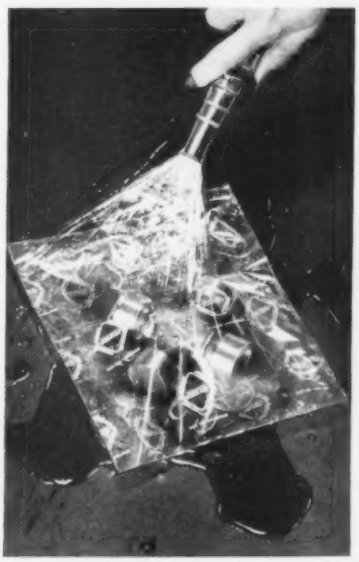
VOTATOR CONTINUOUS PROCESSING EQUIPMENT FOR CHEMICAL & FOOD INDUSTRIES • VOTATOR PISTON & GRAVITY FILLERS • VOTATOR PLANTS FOR FATTY OILS INDUSTRY • THERMEX DIELECTRIC HEATING EQUIPMENT

Strong, clear Du Pont "Mylar"® solves the tough packaging problems

See how combination films using "Mylar"* resist cold, moisture and heat

1. "Flav-R-Pac" corn on the cob stays fresh through freezing, shipping and handling. The vacuum pack of "Mylar" and polyethylene seals in flavor, cuts down on leakers for this Portland, Oregon company.

2. Boiling water can't affect "Mylar" . . . so it's perfect for the heat-in-bag Swift package. The pouch made of "Mylar" extrusion coated with polyethylene, also gives eye-catching, high-gloss, scuff-proof printing.



3. A "Nox-Rust Clear Pak" of specially coated "Mylar" shuts out moisture . . . keeps metal products rust-free. And "Mylar" is so tough that it won't puncture or tear . . . protects against jagged edges.

Ask your Du Pont Authorized Converter† for information about laminated or coated structures of "Mylar". He can supply these combinations as roll stock or pouches.

†For the name and address of Authorized Converters of "Mylar" write E. I. du Pont de Nemours & Co. (Inc.), Film Dept., Wilmington 98, Delaware.

"Mylar" is Du Pont's registered trademark for its brand of polyester film.

DU PONT
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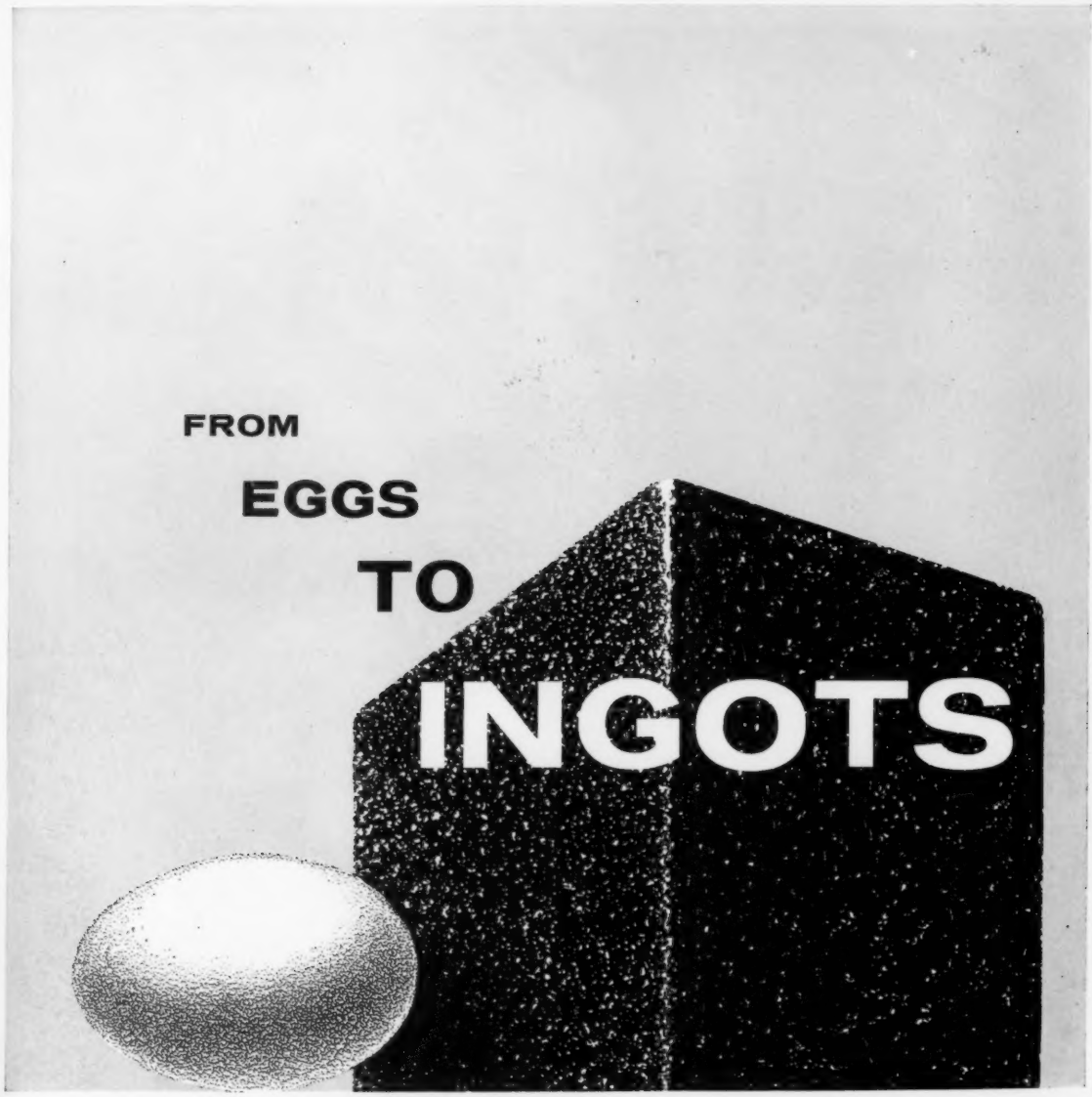
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT MYLAR® POLYESTER FILM



If it has a surface, IME can help you make your mark

An egg. An ingot. Could any two marking surfaces be more different? Yet both, and thousands of surfaces in between are run-of-the-mill jobs with an IME imprinter.

The reason is simple: **IME doesn't make a standard model.** Each one is a custom job, tailored to **all** the customer's needs and his needs only. IME specialists sit down with you, discuss your operation, help you determine your requirements, then design the one method and machine that best meets them. Bags, boxes, cartons, cans . . . eggs, ingots, tablets, toys . . . you can imprint any surface . . . code, date or price any product with an IME-tailored machine. There's no better way to make your mark . . . boldly, clearly, quickly.

IME offers you a complete package: everything from self-contained marking systems to the precise inks that system needs. Write today for informative brochure. Dept.

Custom-designed marking equipment at standard cost

INDUSTRIAL MARKING EQUIPMENT COMPANY, Inc. / 655 BERRIMAN ST., BROOKLYN 8, N. Y.

ime

ANYTHING GOES–IN AST

It takes imagination to design just the right container for your product . . . the corrugated box best suited for its shipping, storing, stacking, handling and selling. And if you were to visit the design department of a St. Regis box plant, you'd know you came to the right place.

There you see actual experimental container designs of every description. Boxes custom-made for "difficult" items. Boxes that convert to displays. Boxes built to weather the elements. Boxes made for automatic packing. Boxes designed for "impulse" sales. All show the remarkable versatility of our packaging engineers.

Each time a new box design or packaging technique is developed in one plant, it is immediately available at all of our plants, so every St. Regis customer stands to benefit.

ST. REGIS® CONTAINER!

From a nationwide family of fine St. Regis corrugated plants, you'll gain in many ways: Well-seasoned, imaginative designers serve you on both local and national levels • Consistent quality is assured from St. Regis tree to St. Regis box • New packaging materials continually emerge from a fully staffed research department • And you'll enjoy working with the friendly, experienced people who *are* the St. Regis Container Division!

Anything goes . . . in a St. Regis container!

CONTAINER DIVISION

St.Regis PAPER COMPANY

150 EAST 42ND STREET, NEW YORK 17, N. Y.

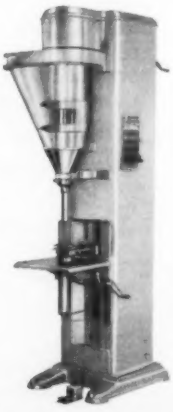
PLANT LOCATIONS: Birmingham, Ala. • Fullerton, Calif. • Salinas, Calif. • Jacksonville, Fla. • Chicago, Ill. • Dubuque, Iowa • Hagerstown, Md. Minneapolis, Minn. • Buffalo, N.Y. • Albany, N.Y. • Canton, Ohio • Cleveland, Ohio • Coshocton, Ohio • Newark, Ohio • Crafton, Pa. Mt. Wolf, Pa. • Pittsburgh, Pa. • Dallas, Tex. • Garland, Tex. • Houston, Tex. • Tacoma, Wash. • Grafton, W. Va. • Milwaukee, Wis.

FMC Auger Filler versatility matches Cal Spray product diversity

California Spray Chemical Corporation, well known producer of agricultural and specialty chemicals, has relied on FMC Auger Fillers for many years to accurately package products which have widely different densities and flow characteristics. Eight automatic and semi-automatic fillers in four Cal Spray plants are used to package such chemicals as wettable DDT, rose dust, bug meal, and tomato dust in bags, cartons, boxes, squeeze containers and cans in sizes ranging from 10 ounces to 6 pounds or more.

Ability to successfully handle such a varied "product mix" is the rule, not the exception, for FMC Auger Fillers. The semi-automatic Model EG-1 shown here comes equipped with four filling methods (cam volumetric, packing, gross weight and volumetric combined with vacuum) for both tight and loose fills. Hence, this one unit handles an almost limitless variety of products and containers . . . perfect for short runs. Many other models, semi-automatic and automatic alike, are available to satisfy unusual requirements for accuracy of fill or type of packing in both rigid and flexible containers at speeds up to 140 units per minute.

For the full story of the FMC line of Auger Fillers, write for your copy of Bulletin P-811.

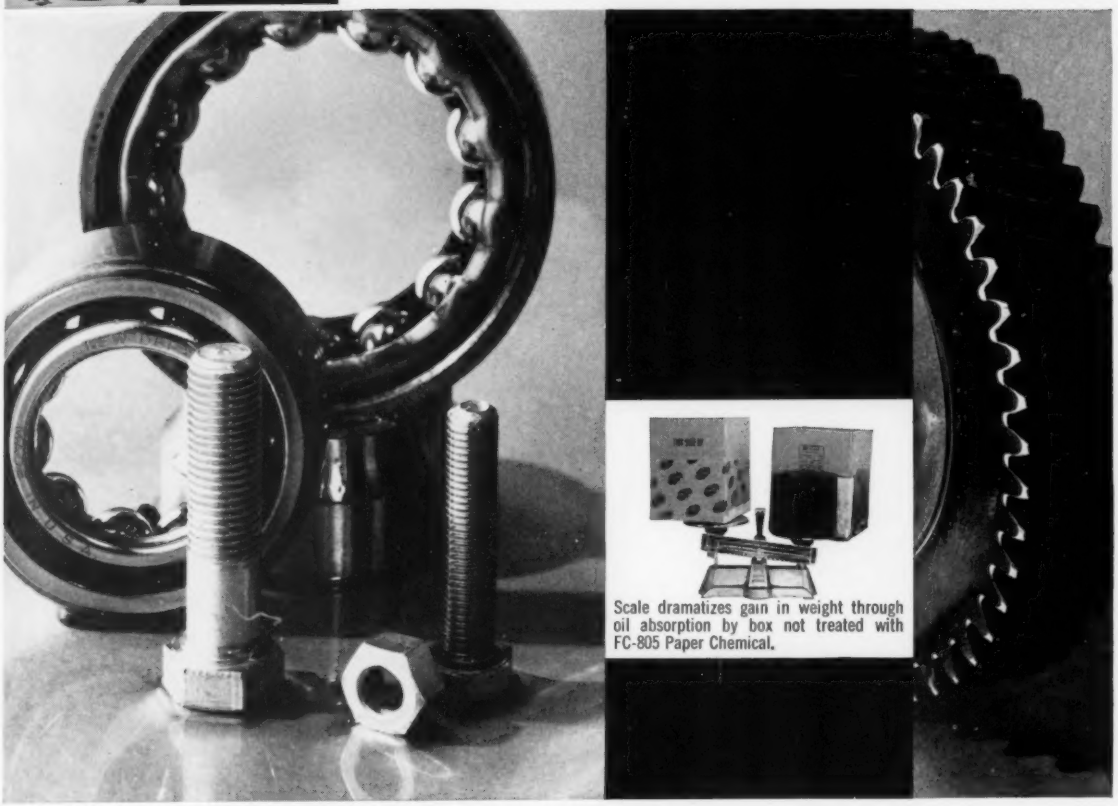


Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
FMC Packaging Machinery Division
Stokes & Smith Plant
4994 SUMMERDALE AVENUE, PHILADELPHIA 24, PA.

3M COMPANY CHEMICALS

THE RAW MATERIALS OF PROGRESS



Scale dramatizes gain in weight through oil absorption by box not treated with FC-805 Paper Chemical.

You can lock grease and oil inside paper boxes treated with 3M Brand FC-805

PAPER CHEMICAL

Proof positive that FC-805 Paper Chemical locks in oils and greases necessary to your products—and helps keep your paper carton clean and readable. The box on the left (inset above) was treated on the inside only with FC-805. Its counterpart on the right was not treated at all. Then, both were packed with sweeping compound and subjected to boiler room temperatures of 110° F. to 120° F. for 48 hours. At the end of that time, the untreated box had already absorbed 13% of the oil from the sweeping compound. *The treated box absorbed none.*

Results such as this are common in the field. They can be applied to your packaging problems, too. And with FC-805 Paper Chemical, there's no sacrifice of color, strength, porosity, flexibility, or any other important characteristic. That's because it is a member of the 3M family of fluorochemicals. It is not a continuous film or coating. Rather, *it treats each paper fiber* for maximum resistance to grease or oil.

FC-805 Paper Chemical can help you: Prevent unnecessary wax penetration on waxed papers. Permit use of thinner-than-normal polyethylene coatings. Prevent grease crawl and staining at seams and closures in multi-wall bags. Help "hold out" dope and prevent strike-through in carbonizing tissue. Give unparalleled resistance to asphalt penetration. Permit packaging of greasy and oily parts without penetration. In these many ways, FC-805 Paper Chemical has helped industry solve packaging problems of long standing.

And for flexible, see-through packaging—look to KEL-F® Brand Plastic. Film made of this product is completely impermeable to water vapor, virtually unaffected by heat, caustics, acids, temperatures, rough handling, storage and shipping. Ideal for paints, cosmetics, pharmaceuticals and chemicals, it provides maximum packaging security, good looks and convenience.

Learn how these 3M products can help you. Tell us your problem in a letter addressed to: 3M Chemical Division, Dept. KCA-90, St. Paul 6, Minn.

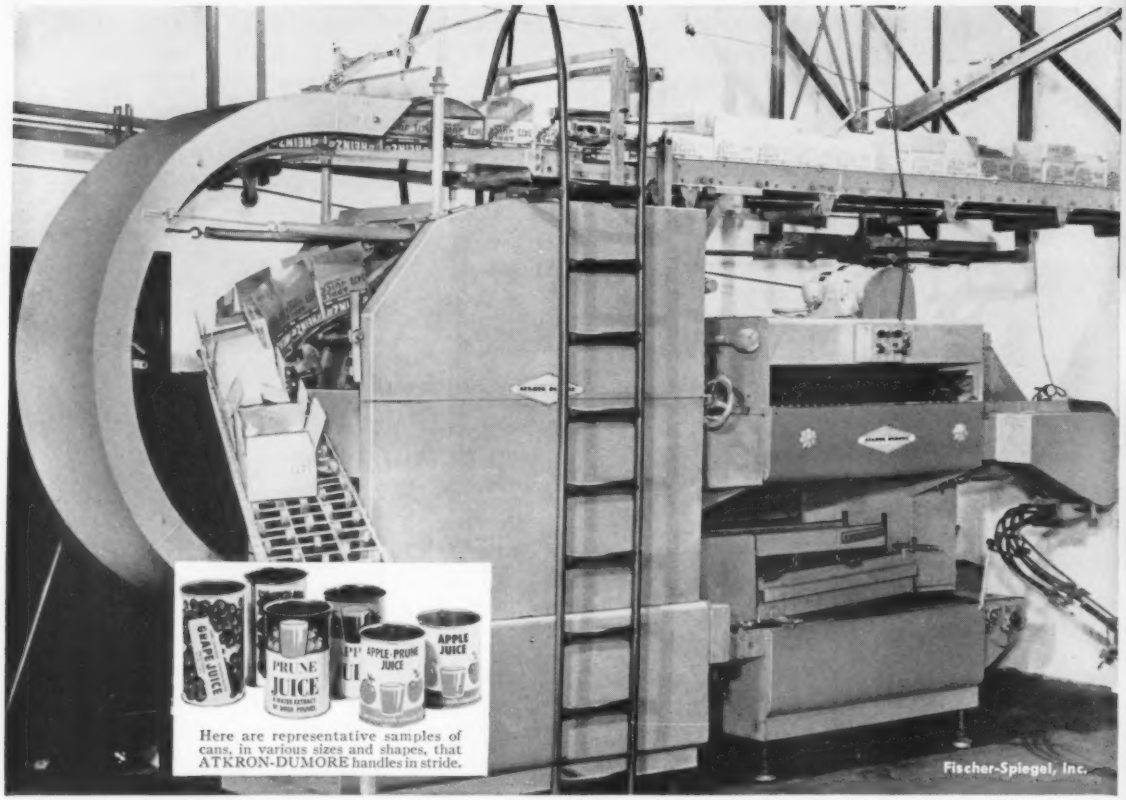
"KEL-F" is a Reg. T.M. of 3M Co.

CHEMICAL DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY


GRAPE JUICE
PRUNE JUICE
APPLE-PRUNE JUICE
APPLE JUICE
Here are representative samples of cans, in various sizes and shapes, that ATKRON-DUMORE handles in stride.
Fischer-Spiegel, Inc.

Food Processor Cuts Costs with Atkron-Dumore Can Sorter-Uncaser!

Fischer-Spiegel, Inc., of Geneva, Ohio, private brand processors and packers of fruit concentrates and juices for many of the world's largest companies, enjoys an annual production in excess of two million cases. Since it began operations in 1946, with a plant area of 1,800 square feet, the company has increased its operations to 60,000 square feet.

To build this volume of business, Fischer-Spiegel obviously had to be on its toes . . . constantly seeking ways to increase production and successfully combat rising costs.

Fischer-Spiegel took one major step in this direction, by installing the ATKRON-DUMORE Can Sorter-Uncaser. With this unit, a two-man team *now* does twice the work that had required seven! One man picks up skids of cans in the warehouse and loads them on the Infeed Conveyor . . . the second man supervises the operation of the Can Sorter-Uncaser. This same two-man team has time to handle all changeovers of the unit.

The ATKRON-DUMORE Can Sorter-Uncaser also saves Fischer-Spiegel time and money, by making it possible to handle cans in various sizes with only minutes required for changeovers.

The ATKRON-DUMORE Can Sorter-Uncaser is *more than paying for itself!* Continuous motion eliminates costly stoppages, space requirements are minimized, lithographed cans are protected, and open end cans guarded against damage. *In addition, the ATKRON-DUMORE Can Sorter-Uncaser can handle reshipper cartons, shipper trays, bags or bulk . . . with amazing efficiency!*

Profit from the experience of Fischer-Spiegel. Write for information on other Atkron-Dumore equipment including: Flap Openers, Case Packers, Full and Half Depth Uncasers. *This can easily make the difference between profit and loss in your plant.*

ATKRON DUMORE

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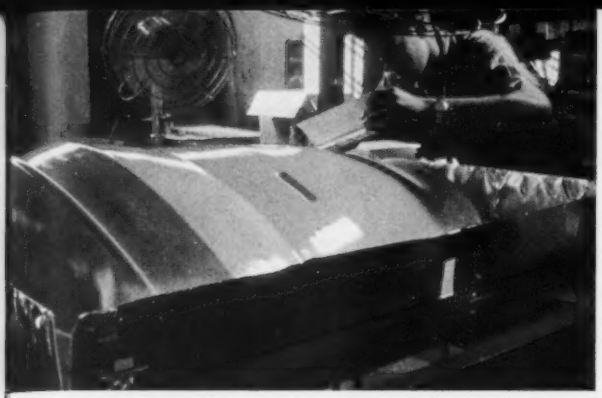
ATKRON DUMORE

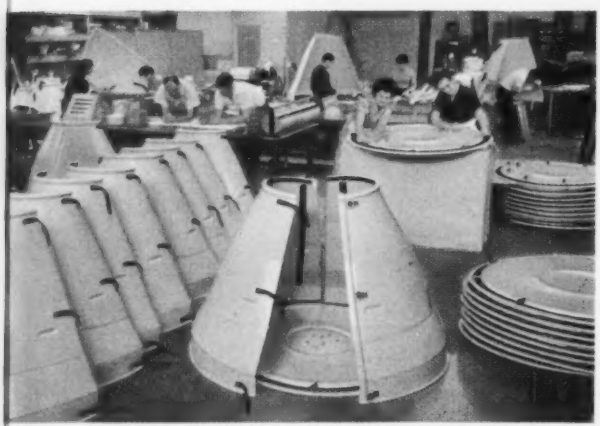
AT-660-168

For more information circle No. 229 on Reader Service Card



THERMOFORMING . . . Pull-down of vacuum form occurs at about 375°F. Operator is shown stamping serial number on cover half during cooling cycle.

FINISHING . . . After trimming, rubber shock strips are applied with epoxy adhesive. Flame treating oxidizes and prepares desired surfaces for adhesive.



ASSEMBLING . . . Hardware is mounted and finished cover inspected. Notice circular base with perforated desiccant container.

PACKING . . . at Aerojet-General, thrust chambers are protected for shipment. Protective covers remain on until firing.

Rocket Engine Covers Thermoformed from MARLEX* Sheet

This unique packaging item, made by Thermo-Plastic Products Company of San Carlos, California, protects the first- and second-stage thrust chambers of the Titan missile during missile assembly and shipment . . . right up to actual firing. Initially, these covers were glass fiber laminate. Now, using MARLEX 6002 High Density Polyethylene, Thermo-Plastic does the job at considerably less than the previous cost—providing lightweight covers with high impact strength . . . free from warpage and cracking . . . and chemically resistant to fuels, lubricating oils, greases, solvents, alkalies, detergents, and most acids.

This rocket engine cover is a good example of what can be done as a result of the superior thermoforming characteristics of sheet made of MARLEX. Here, Thermo-Plastic draws to a maximum depth of 22 inches the 54″ x 48″, 230-mil sheet supplied by Kal Western Plastics, Inc., Pico Rivera, California. Cover halves and circular bases are separately formed, yet mate perfectly when assembled to provide a gasket seal against moisture.

If you are interested in heavy-duty, large or small shipping containers . . . or such items as tote boxes, refrigeration liners, dome covers, trays, any item involving the structural forming of sheet—MARLEX can be your answer for improved quality at less cost. Thick and rigid, thin and flexible, large or small, the superior physical characteristics of MARLEX sheet permit precision thermoforming to accurate dimensional tolerances. Moreover, there are many MARLEX resins to choose from—providing a wide range of material properties.

For complete details on thermoforming and a list of MARLEX sheet suppliers near you . . . contact one of the offices listed below.

*MARLEX is a trademark for Phillips family of olefin polymers.

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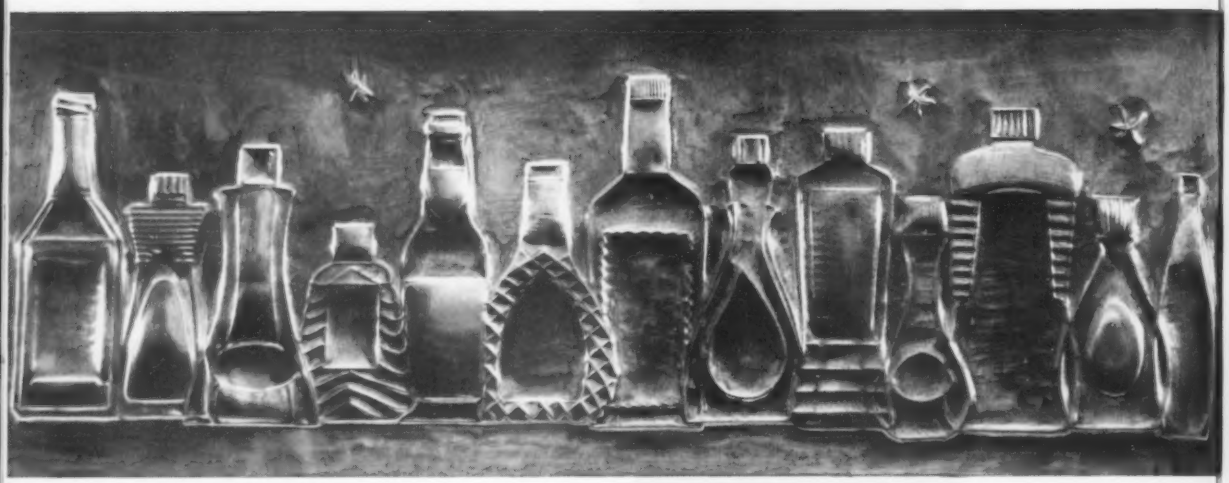

THE PACKAGE . . . AT THE POINT OF PURCHASE . . . CAN MAKE OR BREAK THE SALE.

TWO THINGS MUST BE PARAMOUNT IN THE MERCHANDISER'S MIND . . .
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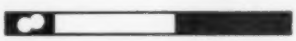
WE BELIEVE WE MAY HAVE SEVERAL PERTINENT THOUGHTS FOR YOUR CONSIDERATION. ECONOMIC MACHINERY COMPANY'S DESIGN SERVICE GOES AFTER BOTH FACETS OF THE PROBLEM . . . ESTHETIC DESIGN AND PACKAGE LINE COST. WHY NOT GET COMPLETE DETAILS ON THIS DIFFERENT DESIGN SERVICE?



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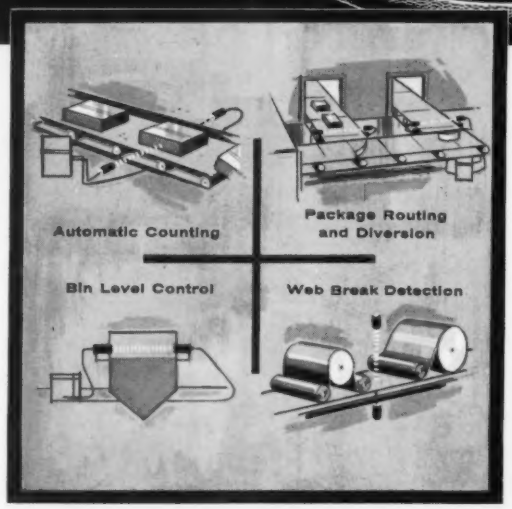

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NON-CONTACT SENSING AND SWITCHING SYSTEM

Before Sonac, sensing and switching control systems which involved breaking a beam of energy were limited by vibration, dust, smoke, steam, air contamination and too much or too little light. Sonac's ultrasonic energy "beam" is completely free of these limitations. The acoustic lens on Sonac sensors can actually be painted without affecting performance. Utilizing high frequency sound also means there are no lamps to burn out. Savings in replacement parts and maintenance time often means Sonac pays for itself. Sonac is completely transistorized, providing you with a rugged, dependable electronic circuit.

These are just a few of Sonac's many uses. Optional equipment includes reflectors for precision beam and positioning control, and coupler assemblies for use with flexible tubing for remote sensor locations. This descriptive booklet will be sent to you on request.

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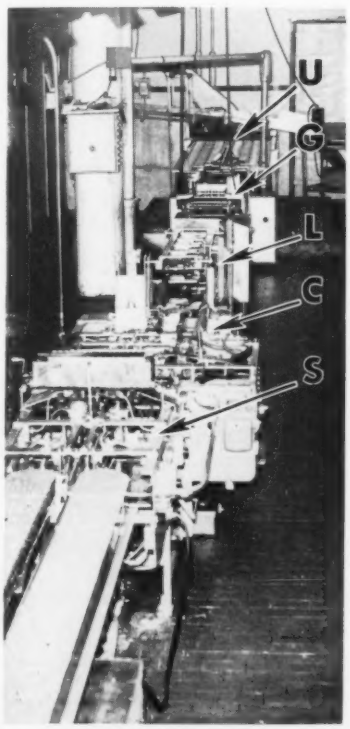
One machine packages fish sticks—in five operations . . .

1. Unscrambling
2. Grouping
3. Loading
4. Cartoning
5. Sealing

By John M. Kohr, *Plant Engineer, Gorton's of Gloucester, Inc., Gloucester, Massachusetts*



1 THIS SINGLE MACHINE, 66 ft. long, now packages frozen fish sticks. Each of five operations depends on one immediately preceding it: unscrambling (U), grouping (G), loading (L), cartoning (C), sealing (S).

Developing automatic equipment to package a specific product—especially one which is not always uniform in shape and size, such as frozen fish sticks—requires complete cooperation among all parties concerned. As a result of such a venture involving the package user, the material supplier, and machinery manufacturers, Gorton's uses one 66-foot machine which performs a sequence of five operations to package its product. Pointing out the problems facing the development group, Mr. Kohr describes in detail each of the five operations which lead to a finished package consisting of a printed, wrapperless, hot-melt-sealed carton containing 16 sticks in 2 layers of 8, and packaged at a rate of 60 cartons per minute.

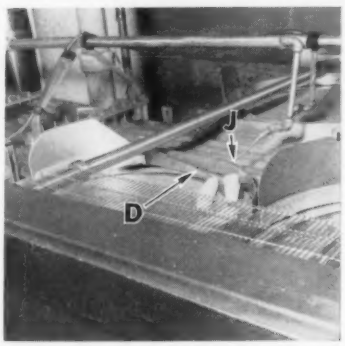
A machine 66 ft. long, to package frozen fish sticks at 60 cartons/min. (16 sticks/carton) resulted from cooperation among our material and machinery suppliers and our own technical people, each group contributing its particular technical knowledge. This project presented some problems, one being the shape of the product.

Our fish sticks are frozen solid after the frying operation. They are roughly rectangular solids, 4x1x¾ in., somewhat rough on their exteriors due to the breading before frying, and are as firm as a piece of wood when frozen. They are now automatically packaged in wrapperless, printed, sealed cartons. Development of this operation took a year of cooperative effort by four different groups.

The fish sticks arrive at the packaging department in a jumbled mass on a conveyor from the freezer. After inspection to remove any defective or broken pieces, the mass is unscrambled and packaged automatically at the rate of 60 cartons/min. The machine (see Fig. 1) that does this carries out the following sequence of operations in which 16 sticks in 2 layers of 8 are inserted into each carton:

2 BUCKET (B), attached to endless chain, carries 2 layers of 8 fish sticks each, and is device to hold sticks in this pattern until they have been placed into waiting carton.

3 CENTRIFUGAL FORCE of spinning disc throws fish sticks to outer periphery of disc, from which sticks emerge into narrow channel. Note: Air jets (J) blow back any sticks that might be atop another at exit gate.



4 DEFLECTOR (D) prevents crowding, or two sticks riding out gate together—an aid in controlling sticks in addition to air jet.

1. Unscrambling (arranging the sticks in regular order);
2. Grouping (assembling the sticks in layers of eight);
3. Loading (placing two layers of eight sticks in a "bucket");
4. Cartoning (pushing the above load into an open carton);
5. Sealing (hot-melt sealing of the printed, waxed cartons).

Initially, The Lord Baltimore Press, sponsor of this project, called upon Manett Enterprises for the unscrambling and loading sections of the machine (designed by Lavern Burnett) and called on Clybourn Machine Corporation for the machine's cartoning section. Lord Baltimore itself developed the sealing operation.

Many of the automatic control devices were developed by our own engineering group at Gorton's. It is difficult to ascribe the success of this operation to any single group or individual because no one feature of the machine can be deemed to be *the* essential part.

Problems To Solve

Among the problems faced in the development of this operation were the following:

Placing two layers of eight sticks into a "bucket" (see Fig. 2)—a sort of fixture to hold the sticks in place prior to placing them in a carton.

Automatic regulation of the number of sticks in the eight files or channels leading to the grouping operation.

A method that would insure that all sticks were lying on their broader (1-in.) side and not on the narrower (¾-in.) side when moving into the grouping operation.

A method of eliminating any crowding of the sticks in the exit channel from the unscrambler.

These are illustrative of the problems that had to be solved and only by the cooperation of all were the solutions attained.

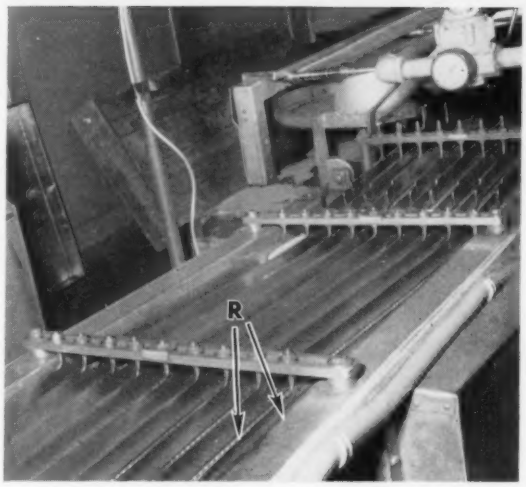
1. UNSCRAMBLING

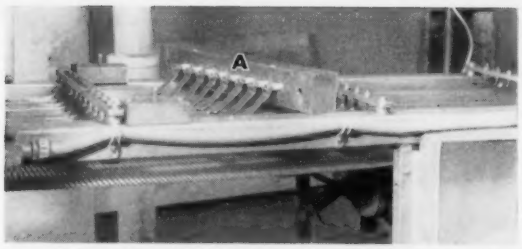
Reviewing step-by-step the individual operations now done automatically, we may look first at the unscrambling of the jumbled mass of frozen sticks. This starts with a wide inspection belt shown in the far end of Fig. 1, the general view of the 66-ft. long machine. This wide inspection area is, however, not a single belt but is actually composed of eight 5-in. woven wire belts placed side by side. These operate independently, but at the same speed when they are moving. The eight belts are driven from the same shaft by eight separate magnetic clutches that are automatically controlled to keep the proper supply of sticks ahead of the next operation.

Need Uniform Product

The frozen sticks are fed onto this wide area of belts where the sticks are spread manually by the two inspectors who remove any defective pieces. It is well known that automation requires uniformity of the product. In this case, broken or irregularly-shaped pieces must be removed. Aside from these two inspectors, no manual help is re-

John M. Kohr is a graduate of Massachusetts Institute of Technology with a B.S. degree. He has been associated with Gorton's of Gloucester, Inc. as plant engineer for over 24 years. Mr. Kohr, a Massachusetts registered professional engineer, is a member of American Institute of Plant Engineers, Institute of Food Technologists and New England Fisheries Technologists.





6 **ELECTRIC SWITCH ASSEMBLY** (A) has 8 metal levers which drop down in respective channels and make contact with wire belt. Sticks passing under lever prevent its contact with belt. Absence of sticks causes lever to contact belt, which actuates magnetic clutch, starting more sticks coming to unscrambling equipment.

5 **WAVY PATTERN** of guides oscillates sticks in channels, causing sticks on edge to topple over on broader side. Pattern is noted by dead space between channel guide and conveyor side (R).

quired in packaging the sticks. There are, however, machine tenders who keep watch for anything that might go wrong on the machine.

Each of the 5-in. belts that constitute the inspection area delivers fish sticks intermittently to each of eight spinning discs shown in Fig. 3. The discs are in two groups, one for each side of the machine, and the discs spin clockwise or counterclockwise depending on which side of the machine they are located. The function of these discs is to align the jumbled fish sticks and send them down a narrow belt to the next operation.

How Unscrambling Works

Alignment, or unscrambling, is accomplished by the centrifugal force generated on the spinning discs. The force throws the sticks to the outside of the disc where they lodge tangentially against a guide rail and are driven to a small exit gate where they escape through a small opening onto a narrow belt that leads to the grouping operation.

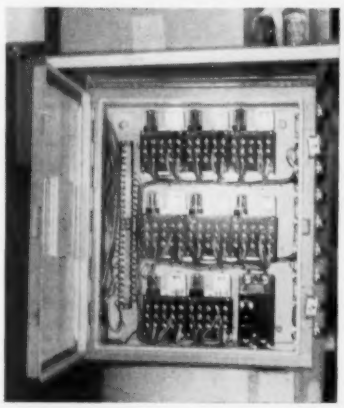
The speed of rotation of the discs is adjusted by a variable speed drive until the sticks are thrown to the periphery with just the right amount of force. At each exit point from the unscrambler, a small deflector is operating to prevent crowding or two sticks riding out together, shown in Fig. 4.

In addition to the deflector is a small air jet operating at about 10-lb./sq.-in. pressure, also shown in Figs. 3 and 4. This jet is to blow back to the center any sticks that may be riding atop another at the exit point. When a stick is deflected, either by the plow or the air jet, it merely goes around the circle again until it takes its proper place and emerges through the exit gate.

As the sticks leave the unscrambling operation, there are eight rows of sticks traveling on a belt between narrow channels as shown in Fig. 5. Some will be on their wider side and some will be on edge. All must be lying on the 1-in. side before they enter the grouping operation. This is accomplished by a side-to-side oscillation brought about by a slight curvature of the guide rails. This (barely seen in Fig. 5) is where the belt moves straight ahead but the sticks are oscillated, and any that are on edge are automatically tipped over and lie flat.

Using Automatic Control

The first automatic control must now be considered. While it is imperative that all channels must be full of sticks just ahead of the grouping operation, it is equally necessary that there will not be so many sticks pressing against the stop mechanism that they pile up and become jumbled.



7 **RELAY DEVICE** contains condensers which take 1 sec. to bleed off their charge before actuating magnetic clutches (discussed in Fig. 6). Note: Tell-tale signal lights at right of box show which belts are supposed to be running—this helps trouble-shooting.

The supply of sticks is automatically regulated by a battery of simple electrical contact switches shown in Fig. 6. The switches are mounted in a single block that can easily be removed during cleaning operations. In principle, their operation is very simple. As long as the sticks are passing continually down the channels, the metallic lever over each channel is kept from contact with the woven wire belt.

But as soon as there is a gap in the line of sticks, lasting longer than about 1 sec., the lever drops by gravity, makes electrical contact with the belt, and a tiny electrical impulse is fed to a relay system in

the box shown in Fig. 7. The relay will then activate the electric clutch in that particular line and start the belt moving that feeds sticks to the unscrambler.

What Relay Does

The design of the relay system is important for it must make due allowance for the small interval that occurs when the contact is lifted by the passage of a stick. Otherwise, the feed belt will stop every time a stick passes the control point. In operation, the feed belt will not stop until the contact has been broken for about 1 sec.

This interruption of operation takes place whenever a continuous line of sticks is in place. The feeding of more sticks will resume as soon as contact is made, and this occurs whenever the line of sticks shortens to the control point.

This delayed action is accomplished by the slow bleeding off of an electrical charge on a condenser in the relay box. After enough of the charge is bled off, the relay will operate, but, if the gap between sticks is too brief, the relay is inoperative.

On the outside of the relay box, there is a series of eight red signal lights that show which belts are operating—a great aid in trouble shooting if stoppages occur. When the switch is held open for a second or more, the row is too long and the supply of sticks is automatically cut off; but, as soon as the row shortens sufficiently, the flow starts again by energizing the electric clutch.

2. GROUPING

At this stage in the machine's operation, there are now eight files or rows of fish sticks all lying on their flat sides and each file is of approximately the same length, and at least three sticks long. The head end of the files of sticks terminates in a series of pockets in the turret-like device shown in Fig. 8.

This turret groups the sticks into the eight that are to be placed in one of the layers in the carton. Since there are to be two layers of sticks in each carton, the turret must deposit two groups of eight sticks, which is the reason the rows or files ahead of the turret must be at least three sticks long.

Vital To Control Grouping

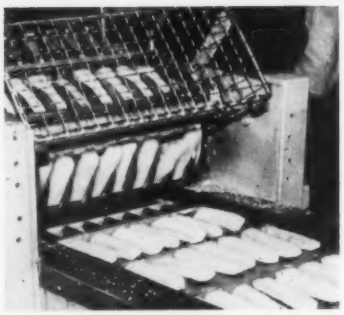
This requirement necessitates a very important control point, the mechanism of which can be seen in Fig. 9. This controls the operation of the turret in grouping the sticks so that the operation cannot go into motion unless there are plenty of sticks available. Any gaps in the grouping would defeat the very purpose of the automation of the packaging operation. At the speed at which this machine operates, it would be almost impossible to insert manually a stick in any gap.

The automatic control at this point is another very simple device consisting of 16 flags so balanced that, whenever there is a stick below the control point, the flag is lowered. If a stick is lacking, the flag goes up and intercepts a light beam. Fig. 9 shows all 16 flags in the intercepting position. If any one or all of them stops the light beam, the clutch is held and will not operate the turret. Yet, as soon as sticks are in place in adequate quantity, the flags are depressed and the grouping action starts again. In normal operation, the turret does not stop its motion, but continues to revolve and deposit the groups of sticks as shown in Fig. 8. It is only when the supply of sticks is inadequate for continuous motion that the turret pauses intermittently.

Depositing Of Sticks

The groups of sticks are deposited in regular order as shown in Fig. 8, and are moved by the conveyor to the next operation. The deposition of the two groups of eight sticks is a very tricky operation and requires careful automatic timing.

The turret is a 4-pocket unit and operated by a Geneva drive of the 6-star, 2-arm type. With this drive operating to fill 60 cartons/min.,



8 TURRET MECHANISM deposits 2 layers of 8 sticks each into the buckets (see Fig. 10). Because turret must deposit 2 layers, there must be at least 3 rows of sticks ahead of turret, which points out need for very important control point (see Fig. 9).

the turret is in motion for ¼ sec. and then stopped for the next ¼ sec. Each time it stops, it takes in eight sticks (one from each row) on the top and deposits a group of eight sticks at the bottom onto the take-away conveyor.

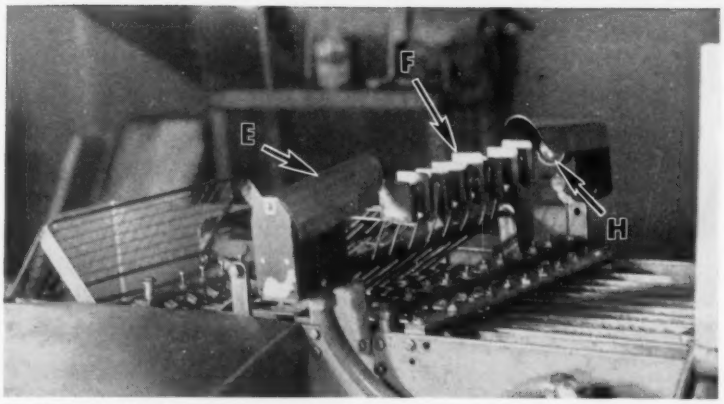
This conveyor consists of a series of pushers, in which alternate pushers are hinged in such a way that they can be dumped into a "bucket" as shown in Fig. 10.

Since it takes two layers of eight sticks to fill a carton, the sticks must be placed into the buckets in the correct manner so that the contents of a bucket may be pushed into a carton at the proper position.

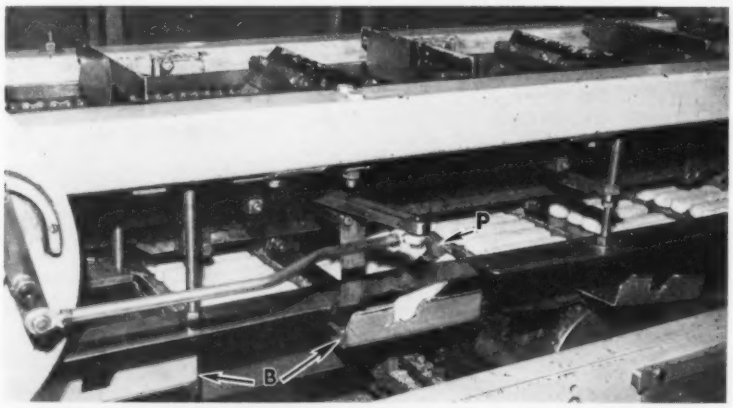
3. LOADING

Loading is nothing more than placing two layers of eight sticks in each bucket. A loaded bucket is shown in Fig. 2, while the process or operation of its loading is shown in Figs. 8 and 10. The alternately hinged sections of the conveyor are timed to dump the load of eight sticks into the bucket and make the bottom layer.

At the next station, the top layer of sticks is pushed onto the bottom layer in the bucket and it emerges as shown in Fig. 2, except that the bucket has been given a quarter turn automatically. This is to present an open end to the waiting carton. Each bucket is on an endless chain that carries it back to the loading position and then turns each one back the quarter turn to receive the next load.



9 CONTROL DEVICE FOR TURRET has 16 flags (F), any one of which can intercept light beam (running between light beam source, H, and electric eye, E). In photo, all 16 flags are up in intercepting position and turret will not run. When stick is below control point in channel, respective flag is down. All flags must be down for turret to run. If single flag is up because of lack of fish stick supply, turret pauses until adequate supply of product is at hand.



10 TAKE-AWAY CONVEYOR for turret consists of endless series of pushers (P), in which alternate pushers are hinged in such manner that they can be dumped into bucket (B). This equipment deposits 2 layers of 8 sticks each (total of 16 sticks) in each bucket.

11 INTAGLIO-ETCHED CYLINDER applies pattern of hot-melt adhesive to sealing surfaces of carton. Cylinder and adhesive are heated to 375°F. as adhesive is applied in precise row of beads. To condition carton flaps to accept adhesive, sealing areas are de-waxed by passing them against heated bars held at 300°F., prior to having adhesive applied.

4. CARTONING

The operation of cartoning is simple and involves nothing unusual. The load is automatically pushed into an open waiting carton; the bucket, now freed of its load, travels around on a chain; and, just before it reaches the loading station, it turns back the quarter turn it had previously been given.

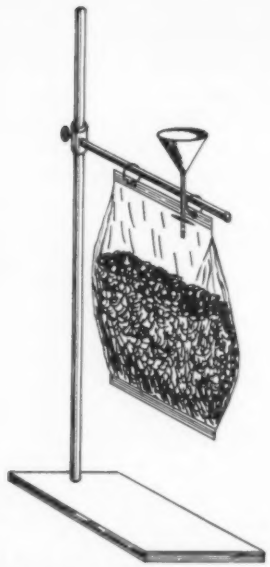
5. SEALING

The cartons, being waxed, are sealed with a thermoplastic adhesive. Since their contents are a frozen product, it is important to use the heat carefully and avoid thawing the sticks. Thermo-Stik sealing of waxed cartons requires first that the sealing areas be de-waxed by passing them against heated bars held at 300°F. This heats the carton board sufficiently for the melted paraffin wax to be absorbed into the board. This conditions the flaps to accept the adhesive as they pass the intaglio-etched cylinder (see Fig. 11) which applies a pattern of melted adhesive to the surfaces to be sealed. Cylinder and adhesive are heated to 375°F. as the adhesive is applied in a precise row of beads.

Carton closure starts at once after the adhesive application. The flaps are closed by plows, and a 10-ft. long compression and cooling unit finishes the job. As soon as the adhesive has cooled, a fibre-tear seal is effected.

Performance, Results

The machine operates at a speed of 60 to 65 cartons/min., and the quantity of material packaged amounts to nearly 3,000 lb./hr. In addition to the improved appearance of the wrapperless carton over one that is wrapped, we find there are fewer rejects on the production line compared to overwrapping. There is also the further advantage of a saving in cost of the printed, waxed, wrapperless carton which is less expensive than the plain carton with its printed, waxed overwrap. *(End)*



SUSPENDING POUCH in this manner allows it to expand and conform to irregular shape of volume of rapeseeds poured into funnel, in determining per cent fill of pouch.

By Mary A. Ciamarella,
Assistant Laboratory Supervisor,
Container Laboratories, Inc., New York

It's easy to find fill per cent of flexible pouches

"What size should the bag be?" is heard often when preparing to go into production of a product to be packaged in a flexible material. Miss Ciamarella offers a simple method for determining the capacity and per cent fill of a package which changes shape, depending on whether it is hanging, lying down, or being held in the hand.

Flexible pouches are being used for many products formerly packaged in glass or metal containers, and even for some items that were never packaged before. Along with their advantages of transparency, economy, and versatility, these flexible pouches can create for the package user some difficult problems in the determination of capacity and per cent fill.

Everyone knows that a metal can looks the same standing on a shelf in a store or in the consumer's hand, but a flexible pouch which appears completely full of gumdrops while lying on the shelf, looks quite different when picked up. The neat, rectangular shape suddenly becomes rather pot-bellied, and the top half of the bag is filled with air instead of mouth-watering candy.

Is the housewife disappointed when the full bag becomes half full? We will leave this question to the psychologists and the motivational researchers. We do not believe it will be answered before many more millions of bags of gumdrops are sold.

What Size To Make The Bag?

Nevertheless, the question, "How full is the bag?" remains of very great practical importance. The Government takes a marked interest in cases of deceptive packaging. Can it be said that manufacturers who use transparent pouches are not liable to charges of deception, no matter how large the pouch, since the consumer can see quite clearly what is contained therein? Some competent legal authorities have voiced private opinions that the Government will not condone slack-filling of transparent pouches on the grounds that there can be no deception.

Another question of great practical importance is, "How large should the bag be?" The foreman on the packaging line that has machinery which forms, fills, and seals the pouches, insists on several inches of head space so that none of the product can be caught in the seal areas and cause lost production. Cost-conscious management wants the smallest bag practicable in order to save money on packaging materials.

The salesmen responsible for getting the pouch onto the store shelves know that store managers insist on pouches that lie flat for easy stacking. Merchandising men

want a pouch of pleasing proportions to enhance the product's appearance. And the legal department cautions that slack-fill must be avoided.

All of these men are likely to turn to the laboratory to ask: "How can we find out when the bag is satisfactorily filled?" The technician is now faced with this difficult problem of determining the capacity and the per cent fill of a pouch which changes shape, depending on whether it is hanging, lying down, or being held in the hand.

FIND BAG VOLUME

The time-honored procedure for determining the capacity of an irregularly-shaped container is to pour a known volume of water into it until the container is full. This method works quite well for a small pouch.

Water Method

A simple procedure follows (see illustration):

1. Select an empty pouch which is completely sealed. (We believe that an almost completely sealed pouch should be used in order to approximate closely the capacity of the finished package.)
2. Make a small cut (a) at one side along the inner edge of the top seal, or (b) through one face of the pouch at the center of the top seal, right at the seal edge.
3. Prepare a support consisting of an ordinary laboratory rod stand with a short bar clamped at a right angle to the rod.
4. Punch two or three small holes in the top seal of the pouch and pass small rings (ones that can be opened, *e.g.*, key rings) through the holes.
5. Slip the rings over the horizontal bar, thus suspending the pouch vertically. The bag and the bar can be adjusted to a convenient height by means of the clamp. (See illustration.)
6. Using a graduated cylinder and a small funnel, pour a known volume of water into the opening in the pouch until it is completely filled. (For small pouches, a hypodermic syringe may be used with less danger of spilling any water.)

Large Bags Pose Problem

This method, while in theory the most accurate, is not so practical for larger bags. Very large pouches are sometimes made from cellophane or electronically sealed polyethylene. The seals of these bags will simply not support the required volume of water. Even if the seals are strong enough, it is difficult to suspend the bag by the method described above because the bag material might be torn by the rings. Attempts to "prop it up" in a beaker while filling water into the pouch usually end in soggy frustration.

It has been suggested that another fluid such as air or another gas could be used instead of water. Under controlled conditions of temperature and pressure it should be possible to measure the volume of gas in a pouch that is inflated to capacity.

Among some of the disadvantages of the proposal are: (a) it would require rather elaborate equipment and trained personnel; (b) there is a possibility that a pouch of unsupported film might stretch from the pressure of the gas; and, (c) unfortunately, this suggestion presupposes a hermetically sealed pouch with no wrinkles in the seal, no pin holes, and with seals of great mechanical strength.

Rapeseed Method

The substitute for water which has been found most satisfactory is the rapeseed—a small, round, extremely lightweight seed. We do not, however, assert that filling a container with a known volume of rapeseed is the same as filling it with a known volume of water. Obviously, the small seeds will not pack as closely as molecules of water. However, the use of *relative*, instead of *absolute*, capacity will not affect our findings.

To determine the capacity of a pouch by using rapeseed, we suggest the following procedure:

1 through 5. Same as 1 through 5 under "Water Method."

6. Pour the rapeseeds into a 1,000-ml. graduated cylinder and tap the cylinder on a lightly padded surface 20 times. If there is an appreciable change in volume, add more seeds and tap an additional 20 times. Continue this procedure until there is no appreciable change in volume.

7. With the use of a funnel, carefully pour the seeds into the pouch.

8. To settle the seeds during filling, continually agitate the pouch by striking the bottom of it with the left hand. Continue filling and shaking until the pouch is as full as possible.

9. Calculate the capacity of the

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CHART

Results Of Determining Per Cent Fill Of Flexible Pouch (Using Rapeseed Method—Triplicate Samples)

Package and product data:

Product	Gumdrops
Label declaration	1.5 lb.
Package material	0.002-in. polyethylene
Style	Pillow-type pouch, printed
Pouch dimensions	6x11¾ in. overall

Test data:	Sample No. 1	Sample No. 2	Sample No. 3	Avg.
Product volume (ml.)	907	905	902	....
Pouch capacity (ml.)	1,670	1,678	1,695	....
Per cent fill	54.3	53.8	53.2	53.8

bag by substracting the amount of seed left in the cylinder after the bag is filled from the amount originally contained in the graduated cylinder (Step 6 above).

Drawbacks

This method admittedly has its own drawbacks. The rapeseeds are quite adept at escaping from the cylinder and pouch. However, losses can be kept at a minimum by placing the apparatus in wide, shallow boxes so that spills can be caught and returned to the proper place.

The determination of the end point, at which the pouch is completely filled, is subjective. An easily satisfied technician will find a smaller capacity than one who energetically continues to tap and settle the seeds.

The method is rather time-consuming and tedious. Especially when the capacity of the pouch exceeds 1,000 ml., and the cylinder must be refilled.

CALCULATE PER CENT FILL

To calculate the per cent fill, the technician must now determine the volume of the *product* contained in the pouch. A method frequently used for determining the volume of irregularly-shaped objects (such as gumdrops) is to drop them into a graduated cylinder containing a known volume of water and to observe the increase in volume. If this were done, barring the difference in volume caused by the candy dissolving, we would obtain an accurate volume for the product, corresponding to the capacity of the pouch as determined by filling it with water. This would be an *absolute* volume.

Relative Product Volume

Most manufacturers include, as part of the product volume, any air spaces among the gumdrops (other candies, tea bags, and so on) as they are placed into the package. Therefore, we must find the volume of the gumdrops *plus* the air space when that *combined volume (candy plus air) is at a minimum.*

TABLE

Group Of Items Whose Individual Per Cent Fill Averages Are Close Enough To Use Single Minimum Fill-Standard

Product	Average Per Cent Fill
Gumdrops	53.8
Candy kewpies	53.9
Gum slices, assorted	54.0
Gum slices, orange	53.8
Spearmint leaves	56.2
Spice drops	55.0

The product volume of the gumdrops can be found easily by the rapeseed method:

1. Prepare the stand with the horizontal bar. Punch the necessary holes for supporting the pouch, in the top seal. (Steps 3 and 4 under "Water Method." Do not insert rings in holes.)

2. Place the sealed bag containing the product flat in the palms. Toss lightly in the air to loosen and distribute the pieces.

3. Grasp the top seal in the right hand; drop the bag ten times into the palm of the left hand from a height of 6 in.

4. Without disturbing the product which has been shaken down to a minimum volume, slip in the rings and hang the bag on the horizontal bar.

5. Adjust the height of the bar until the eyes are level with the highest point the product reaches in the bag.

6. Place a strip of colored adhesive tape across the bag to mark the average height of product in the bag.

7. Take down the bag, remove the product, and reseal the opening with pressure-sensitive tape, but leave a small opening for inserting a funnel.

8. Using a funnel and a known volume of rapeseed, pour the seed into the bag and shake down until the seed level matches the level of the colored marker placed on the bag.

9. Subtract the amount of seed remaining in the cylinder from the amount originally contained. The difference is the product volume.

10. Continue pouring the seed into the bag with agitation until the pouch is completely filled.

11. Subtract the amount of seed now remaining in the cylinder from the amount it originally contained. The difference is the pouch capacity.

12. Calculate the per cent fill by the following formula:

$$\frac{V}{C} \times 100 = \% \text{ fill},$$

where V is the volume of product (ml. of rapeseed, from Step 9 above) and C is the capacity of the pouch (ml. of rapeseed, Step 11 above).

Note 1: Since we are dealing with a ratio, the fact that we measured *relative* volume and capacity, instead of *absolute*, does not affect our per cent fill.

Note 2: It may be desired to find the per cent fill of a pouch containing a more rigid product, such as macaroni or luncheon meat. The dimensions of the product (length, width and height) are easily obtained with a ruler, but the resulting calculated volume is not identical with the product volume determined by the rapeseed method. In these cases, the volume of rapeseed needed to fill a rectangular container of the same dimensions as the product can be found, and that figure can be used as the product volume.

Test Triplicate Samples

The determination of pouch capacity and product volume should be made on three different bags, and the individual per cent fills and average fills should be calculated. Triplicate determinations of per cent fill should agree within 5 per cent. It should be possible for two technicians to find average per cent fills (on different sets of bags) which agree within this range of 5 per cent.

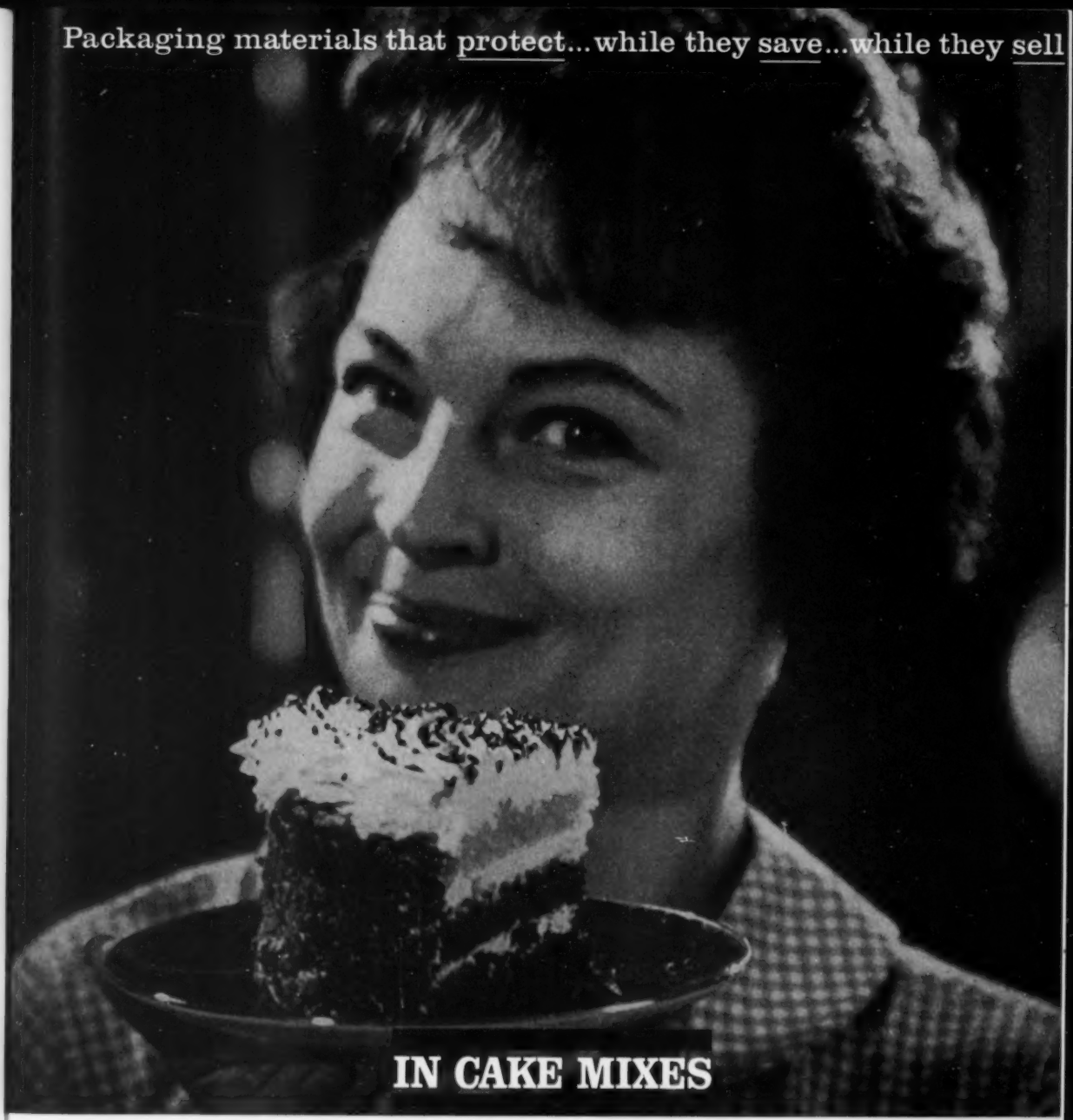
Sample data is given in the chart. Note that the per cent fills are well within the 5 per cent range.

Is Bag Filled Properly?

When the per cent fill has been determined, there still remains the problem of deciding whether the bag is satisfactorily filled. Minimum fill-standards should be set to make existing bag dimensions legitimate, and to act as guideposts in decisions involving future pack-

(Continued on Page 120)

Packaging materials that protect... while they save... while they sell



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The amount of down-time for machine change-overs and repairs becomes increasingly important as labor costs continue upward. Facing this fact, The Wm. S. Merrell Company has taken an approach to the problem in an attempt to reduce lost time. Pointing out his belief that the group responsible for set-ups and change-overs of a machine should also repair and maintain it, Mr. Breslin tells how his company's system works—the job classification system and a two-year training program which is broken down into a five-phase course. He stresses preventive maintenance as an important means of minimizing down-time and explains how a card file system controls maintenance in his company.

Trained mechanics, preventive maintenance, reduce machine down-time

By John D. Breslin,
Manager, Packaging Department, The Wm. S. Merrell Company, Cincinnati

The fact that packaging line change-overs and breakdowns cause substantial lost time is news to no one. This is something that all of us must face. Although I offer no wide-sweeping panacea for this problem, I do suggest an approach that we have taken in an attempt to reduce this lost time.

Who Should Maintain Machines?

The group of men with the most control over this lost time is made up of those who perform the set-ups, change-overs, and maintenance of the packaging equipment. In many packaging departments, these may be one, two, or three different groups. Frequently, the men who make the set-ups and change-overs are packaging employees, and those doing any maintenance on the equipment are assigned to the maintenance department of the engineering division.

Without detracting anything from our own able maintenance department or those of other companies, it is my belief that the group responsible for set-ups and change-overs of packaging equipment should also be responsible for its repair and maintenance, within certain limits which are indicated elsewhere in this article. And where the set-up and adjusting of high-speed packaging equipment is concerned, I do not believe there is any such thing as *too much knowledge.*

The best way for any company to train able set-up men and machinery adjusters is to have these same men capable of making minor and major repairs to this same equipment. By having these men perform regular preventive maintenance assignments, they become familiar with the complete working functions of high-speed packaging equipment, and, through this familiarization, learn important factors about the cause and effect of machinery adjustments.

Men Immediately Available

The man who is familiar with the complete mechanical workings

John D. Breslin is a graduate of the University of Cincinnati, where he received his degree in chemical engineering. He has been associated with The Wm. S. Merrell Company since his graduation, having spent several years in a staff capacity, as packaging engineer, prior to assuming the responsibility for the actual operating departments. Mr. Breslin is a member and former director of the Ohio Valley Packaging Association.

of a piece of equipment is not liable to make an adjustment which will seriously damage the packaging machine. In addition, he is very apt to know the precise adjustment which will rapidly clear up any difficulty that the operator may be having with the machine.

This means that each packaging department must have its own corps of highly skilled mechanics under the direction of the packaging department manager. This last is important because, when a mechanic is needed, he is needed *now*, not when he is finally located in some other part of the plant. In our plant, our packaging mechanics perform all the change-overs, machine adjustments, and set-ups, as well as all preventive maintenance work and repairs—with the exception of that work which requires the services of an electrician, millwright machinist, or welder.

HOW TO DEVELOP MECHANICS

It is extremely difficult to hire a new man who has had the propper training and experience to step into a packaging mechanic's job and perform the job satisfactorily. On-the-job orientation, training, and experience are necessary prerequisites.

What Mechanics Do

We have established job descriptions for all of our employees. Some of the basic information contained in the job description of a packaging department mechanic is shown below:

1. The general function of the packaging mechanic is to set up, adjust, and maintain equipment and machinery in the packaging department under the direction of the chief packaging mechanic.
2. Some specific duties include:

a. Sets up, adjusts, and makes major changes and repairs (except those assigned to maintenance department) on production equipment in the assigned areas.

b. Lubricates and performs other preventive maintenance on all packaging equipment.

c. Reports defective equipment and needed repairs to chief mechanic. Aids in periodic inspections.

d. Performs other duties as requested by the supervisor.

e. Practices proper sanitation and safety procedures.

In addition to the specific duties and responsibilities outlined in the job description, the mechanic must gain a thorough knowledge of all of the various types of packaging machinery in the department, and familiarize himself with the many and varied products and packaging materials processed through this machinery.

Develop Own Mechanics

In general, we prefer to upgrade and train existing employees to fill vacancies in the packaging mechanic group rather than hire new employees. This gives us the opportunity of reviewing the employees' performance records and to evaluate their mechanical aptitude and mental capabilities before selecting the man to fill the vacancy. Because these are jobs of a fairly skilled nature, they pay reasonably well and we seldom have any difficulty in obtaining applicants for our occasional openings.

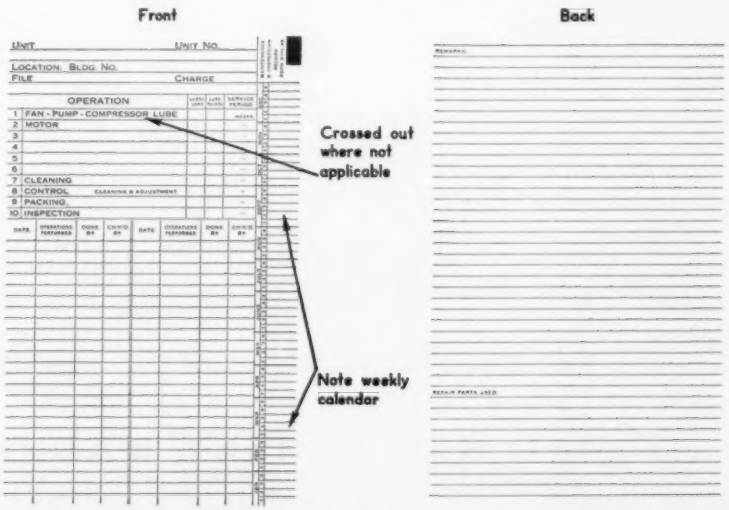
We feel that a good mechanic, like good bourbon, is the product primarily of time and patience, although we expect to develop a good mechanic more rapidly than the aforementioned spirits. When a man is selected for training to become a packaging mechanic, he is put into the job classification of "assistant mechanic." We normally expect that at the end of a two-year training program, this man would be capable of promotion to a full-fledged mechanic's job. During this two-year period, his training program would be broken down approximately as follows:

Five-Phase Training Course

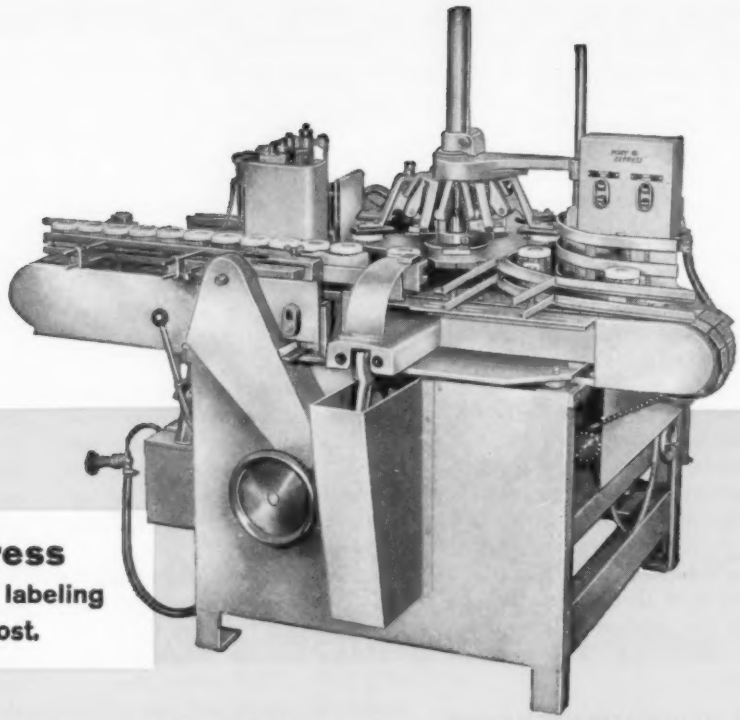
First phase . . . . Familiarization with departmental equipment, functions, products, packaging materials, and operating procedures. This phase would be varied, depending on the man's previous experience in the packaging department.

Second phase . . . . Training with basic hand tools and the specific tools of the packaging department mechanics. Familiarization with the nomenclature and technology used by these mechanics. This is done under the direction of the chief mechanic and is also variable, depending on the man's previous experience.

Third phase . . . . Assist the packaging department mechanics with the full scope of their regular duties in order to learn the actual set-up and maintenance procedures for the various pieces of packaging equipment. *(Turn page)*



1 "LUBE CARD" FILE SYSTEM is used in preventive maintenance plan. Each piece of packaging equipment has its individual card which lists all important information and specifications regarding that piece of equipment and indicates frequency of maintenance required.



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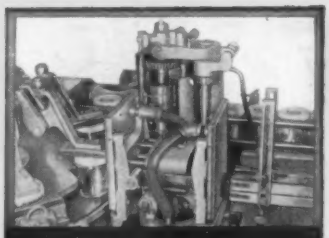

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Fourth phase.... The trainee is assigned actual maintenance jobs which he performs under the supervision of the chief mechanic.

Fifth phase.... The trainee will spend approximately one year performing regularly assigned set-up and maintenance jobs with the help and guidance of the other mechanics, where required.

Fixing Responsibilities

Each of these men is assigned specific pieces of equipment which are his responsibility. This means that he will be the man who will clean this equipment, who will perform preventive maintenance on it in accordance with our established system, and, where practical, will make all necessary set-ups, change-overs, and adjustments. These assignments are rotated periodically to broaden the experience of the men.

Naturally, it is not always practical to have the assigned mechanic do the set-up on one machine if he is busily engaged in trying to correct some difficulty with another, but the important thing to be stressed in this entire article is *that the group which does the maintenance on packaging machinery is the same one responsible for the proper set-up and adjustment of this machinery.*

One of the paradoxes of this type of organization is that, if the mechanic has done a good job of set-up and preventive maintenance, he will actually have less work to do, since the reward of good set-up, adjustment, and maintenance is trouble-free operation.

The Need For Cooperation

There is one serious pitfall to guard against in establishing such a system as this—good mechanics tend to develop pride in their ability. This, in itself, is wonderful, but if this pride takes the form of reluctance to ask for the help of the maintenance department specialists, it can prolong, unnecessarily, a major breakdown.

We, fortunately, have managed to establish very good relations be-

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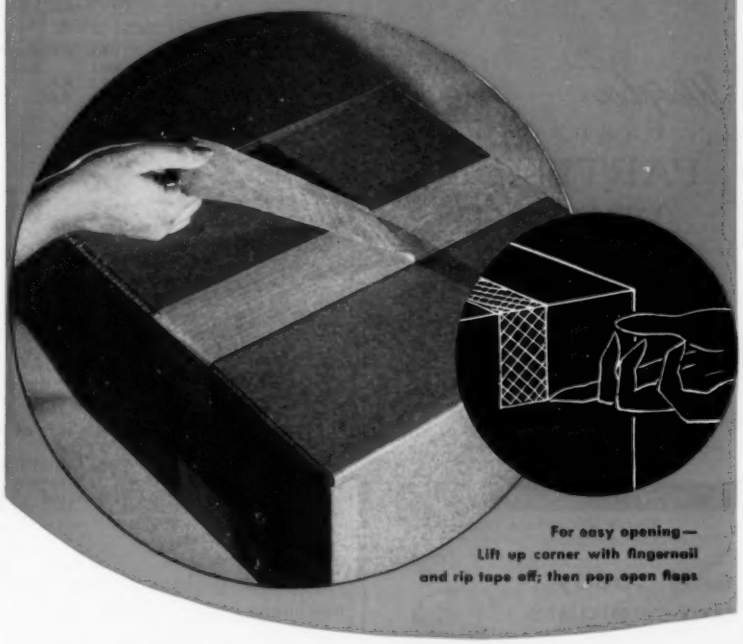

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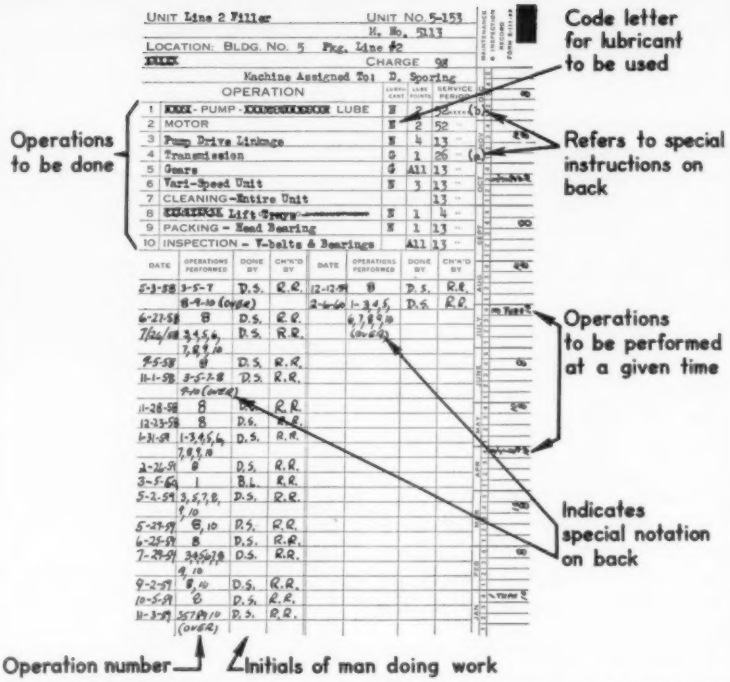

2 FILLED OUT SAMPLE shows how card is used in preventive maintenance plan. When card indicates equipment needs maintenance, it is removed and given to mechanic assigned to machine. Upon completion of assigned maintenance, mechanic fills out card and returns it

tween our packaging department mechanics and the specialists in our maintenance department. They respect each other's knowledge which is extremely important if they are to work together successfully.

When Overtime Pays

We are all faced with the responsibility of keeping overtime to an absolute minimum, but there are many times that overtime will be the most economical way to make a major change-over and set-up. We have found that, very often, a group of three men can make a change-over on overtime in approximately half the time it would take if it were made during a normal operating day.

During this time, after the close of regular plant operation, they are not faced with the demands of other lines for their services, and the group of line operators are not idle for the period of the change-over. Perhaps I should qualify this word "idle" somewhat; we, like all others who are faced with these change-overs, try to provide fill-in work for our operators to perform during our line change-overs. However, as a general rule, they are much less efficiently employed on this fill-in work than they would be on their packaging line.

Keep Pace With Speeds

Up until now, we have dealt primarily with the problems of establishing this packaging mechanics group and the problems involved with their duties of set-up and change-over. As packaging technology advances, new machines are found to do the work of manual operators, and the speeds of existing machines become higher and higher.

Unless our efforts to upgrade the men responsible for the proper operation of this equipment advance as rapidly, we may find ourselves in the same dilemma as the Arabian sheik who ordered a

Back
REMARKS: (a) Check oil daily - drain and change every 26 weeks.
(b) Remove bearing shaft assembly - clean and grease.
5/3/58 Had to Drill Hole in Cover to Reach Grease Fitting R.R.
7/26/58 V-Belts Oil D.S.
11/1/58 V-Belts Oil D.S.
2/3/59 Bearing Full of Product, Shaft Corroded. Replaced Shaft and Bearing. Replaced V-Belts for Turrent and Main Drive R.R.
2/21/60 Cleaned Entire Machine, Changed Transmission Oil, Replaced V-Belt-Drive to Transmission & Transmission to Pump. Scraped and Rust-Proofed Base, Put Finishing on Door to Keep Liquid Out. D.S.
REPAIR PARTS USED: 11/3/59 2-Fafnir Pillow Blocks 1"Dia.
1 - New Drive Shaft
1 - 3390 V-Belt
1 - D-68 V-Belt
2/21/60 1 - 5L-340 V-Belt
1 - 5L-340 V-Belt
Special instructions
Note initials of man doing work
Spare parts used

to chief mechanic who checks work if necessary. Card is returned to file and red flag (see Fig. 3) moved to next maintenance period. Black square, upper right-hand corner (front), has definite purpose (see Fig. 3).

$10,000 automobile and then found that his country had no roads on which to drive it.

PLAN PREVENTIVE MAINTENANCE

Preventive maintenance has been mentioned previously, but primarily, as part of the over-all function of the packaging department mechanic. It is, however, a subject which, in itself, is increasing in importance as rapidly as the previously mentioned packaging technology. Machines capable of 60 containers/min. were relatively simple in design and could be repaired in a fairly short period of time, should a breakdown occur.

The piece of equipment doing the same job at 160 containers/min. is much more complex, and a breakdown on it can be much more serious, both from the standpoint of the larger volume of lost production in the same period of time and from the complex nature of the equipment itself.

Preventive maintenance is exactly what its name implies—maintenance which is done when it is convenient to do, in order to prevent machine failures and emergency repairs to the equipment when it is productively engaged. Preventive maintenance includes lubrication with the right lubricant at the right time cycle, but also involves far more than this . . . it includes periodic tear-down and inspection of all parts for wear and potential malfunction. By spotting these trouble points while the parts are worn, but still operative, the parts can be replaced before they completely break down the equipment; also, they can generally be replaced at a far lesser cost.

How To Plan A System

A preventive maintenance system can be established by anyone in any plant for any purpose. It can be used on anything from typewriters to jet bombers and from microscopes to canals. It takes a

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little work to set up a good preventive maintenance system.

Basically, for each piece of equipment, it is necessary to know what type of lubricant should be used, the frequency of lubrication for the various parts of the machine, the number of lube points in each group, the frequency of cleaning and inspection, and any specific points of wear which should be noted while inspecting.

The mechanics who perform this preventive maintenance must have sufficient knowledge and training to recognize conditions of wear and potential trouble, and to adequately disassemble and reassemble the equipment to insure complete and effective inspection.

Using "Lube Cards"

We use what we call the "Lube Card" system which is merely a card file for each piece of equipment. The file lists all of the important information and specifications regarding that piece of equipment, and indicates the frequency of service. Samples of the blank cards are shown in Fig. 1.

Note that some general basic information is printed on these cards, but, for the most part, that they are blank. Fig. 2 shows a sample card filled out. Note the weekly calendar along the right-hand edge. The numbers of the operations that are to be done during a given week are listed there.

How Visible Record Works

These cards are kept in a visible record-type file with the title of each card on the edge. These titles remain in the file at all times. A red "flag" is moved along them to correspond to the weekly calendar which is inserted above it. When a card indicates that a piece of equipment is ready for maintenance, the card is removed and given to the mechanic to whom the machine is assigned. When the mechanic has completed the assigned maintenance, he fills out the card and returns it to the chief mechanic who checks the work, if necessary. The card is then returned to the file and the red flag is moved to the next maintenance period.

Even the black square in the upper right-hand corner has a purpose. There is a hole in the title slip and, if the card is present in the file, the black spot is visible through this hole. If no spot appears, it is obvious that the card has been pulled so that some maintenance can be performed on that piece of equipment. (See Fig. 3.)

Maintaining Motors

The departmental mechanics perform all preventive maintenance called for on the lube card, with the exception of motor maintenance. This is performed by the maintenance department's electrical staff at the request of the packaging department. These same maintenance cards serve as a requisition for this work and are sent to the maintenance department when motor maintenance is required.

(Turn page)

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Quality ELLISCO containers boost your product's sellability, support and enhance your reputation. ELLISCO experience and specialization in industrial cans will save you money . . . and we offer an extremely wide range of styles and sizes to meet your requirements.

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BAldwin 3-3405

Circle No. 239 on Card

New L.A.B. RECORDING PACKAGE COMPRESSION TESTER

Handles greater volume of testing than previous models because platen remains fixed while pressure is applied by upward drive of base platform. Counterbalanced platen can be adjusted to desired height in seconds.

Pressures and deformation are automatically plotted on an electronic X-Y recorder (standard equipment) to provide a permanent record of each test.

Available in 2,000, 5,000 or 10,000 lb. compression ranges. Models for 48", 60" or 72" maximum height, all with 40" x 40" base platform and platen. Meets ASTM standards.

- Compact, rugged, economical to buy, operate and maintain
- Built specifically for tests on shipping containers, packages and packaging materials

WRITE FOR COMPLETE CATALOG SHEET

L.A.B. CORPORATION
Skaneateles 5, N.Y.

Circle No. 240 on Card

Label changes

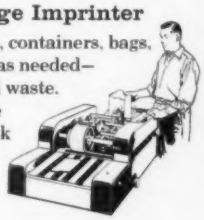
without printing new labels

Availability of supplies and fluctuating prices often clutter up stockrooms with obsolete pre-printed packaging materials. Thousands of firms have been able to avoid this all-too-common waste by imprinting prices and mandatory data on labels or small cartons as they are needed—with a Tickometer.

- A few minutes is usually sufficient to imprint labels and wrappers needed for a day's production. The Tickometer will imprint specifications, weights, colors, sizes, serial numbers, codes, etc., on most weights and finishes of paper and light board in sizes from 1 by 2 up to 15 by 15 inches – from 400 to 1,000 a minute.
- It can save time and work in marking, stamping, endorsing, dating or canceling forms, checks, coupons, tags, tickets, cards, etc. It also counts – *is so accurate that banks even use it to count currency.* Can be set for a predetermined count, to give partial amounts or totals, or equipped for consecutive numbering.
- Feeds and stacks automatically, is easy to operate, can be used by anybody. May be rented or bought, with Pitney-Bowes service always available from 320 points.
- Call the nearest Pitney-Bowes office for a demonstration. Or send coupon for free illustrated booklet and case studies.

Model 4800 Package Imprinter

Imprints folding cartons, containers, bags, etc. up to 7,500 an hour, as needed—reducing inventories and waste. No tools required, can be operated by anybody. Ask for a demonstration, or send coupon.



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Imprinting & Counting Machine

Made by the originator of the postage meter . . . 139 offices in U.S. and Canada.

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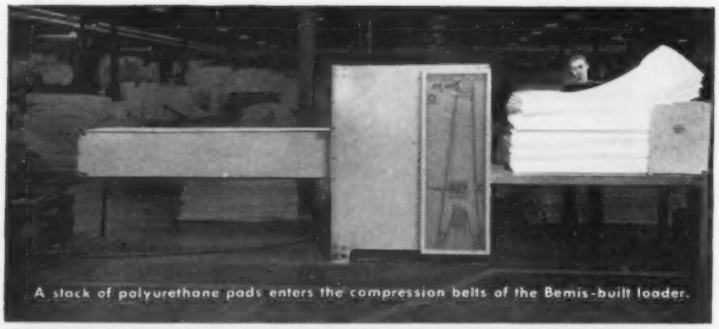
Stamford, Conn.

Send free illustrated booklet and case studies on:
☐ *Tickometer* ☐ *Package Imprinter*

*Name*_____

*Address*_____

Bemis Packaging Machines generally compress costs . . . and thus expand profits. In this instance, the machine's job is to compress your products, as well as your costs.



A stack of polyurethane pads enters the compression belts of the Bemis-built loader.

Pads are compressed to 50% of original bulk under a force of about 3,000 pounds.

A Paper Specialty Bag receives the pads . . . fast, efficient, economical.

Where flexible packaging *ideas are born*

Paper Specialty Plants
1058 S. Vandeventer, St. Louis 10
Albion, N. Y., Crossett, Ark., Fullerton, Calif.

A recent development that is SAVING a nationally known company $71,900 A YEAR prompts this report, which might lead to substantial savings for you.

IT'S A COMPRESSION LOADER—
But let's start at the beginning . . . some years ago.

Bemis Paper Specialty engineers saw a way to help rubber and automobile companies in their shipment of foam rubber cushions. Paper specialty bags would be *a big improvement* over cartons. But a special *compression* loader would be needed. So Bemis engineers designed and built one. It worked. These loaders have been used successfully and profitably ever since.

But recently, polyurethane began replacing foam rubber in many usages. So, another problem: polyurethane is much harder to compress. But Bemis Packaging Service engineers built a new and improved —and successful—loader to work with Bemis Paper Specialty Bags.

The initial user has run cost studies showing it is saving $1,384 per week, compared with the previous system, or $71,968 in one year (this is, obviously, a large company; your savings might well be less). The loader paid for itself in about one month.

How do the savings come? **1.** Initial container cost (bags replace cartons). **2.** Storage space. **3.** Freight costs (many more units in the same space). **4.** Labor (fewer men load more material per hour).

Further benefits: Neater appearance of the package . . . easier disposal of the emptied package.

Rubber and polyurethane aren't all, of course. If you package *any* compressible product, better see if we can help you. We'll be more than happy to consult with your packaging engineers.

CREATIVE PACKAGING ASSISTANCE
This report is important because it points up the creativity of Bemis Paper Specialty engineers on off-beat problems . . . whether in the development of special packages, or special equipment (Bemis Panel-Pak® System for sheet materials is a good example), or both.

There's a good chance Bemis can help you. Write today.

When a card has been sent to maintenance, a yellow tag is put behind the hole in the title slip to indicate the card's location.

The proper preventive maintenance of a piece of equipment is the responsibility of the packaging mechanic to whom that piece of equipment has been assigned. If he is required to report on the condition of the equipment, this information is recorded on the back of the preventive maintenance card. It serves as a permanent record of when any potential wear was discovered and also of any repair parts which were required.

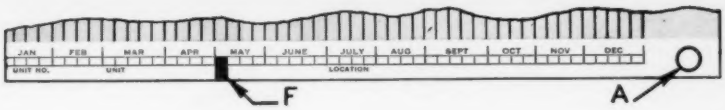
Big Cuts In Down Time

Preventive maintenance cannot solve all of the packaging production headaches, nor can it prevent all of the packaging line breakdowns. However, it can help to prevent many of them, as well as prolong the useful life of rather expensive equipment.

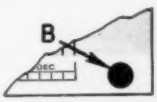
Since the inception of our preventive maintenance program for packaging department equipment, we have noticed a drastic reduction in the down-time from all causes, both mechanical and otherwise. It is approximately 50 per cent less than its level prior to the preventive maintenance program. We feel that there are two primary reasons for this reduction in down-time: (1) The equipment is in better operating condition and, therefore, is not subject to frequent breakdowns; and (2) when a breakdown does occur, the mechanics are more familiar with the equipment and can repair it more quickly.

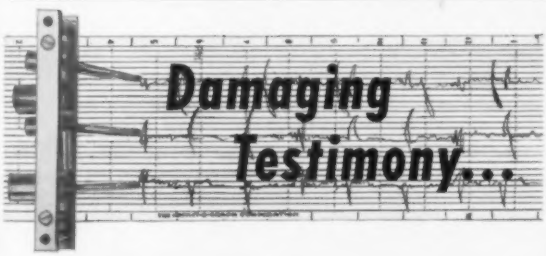
We have found that the familiarity with the equipment also leads to better and faster set-ups and change-overs. As labor costs continue to spiral upwards, down-time from all causes becomes increasingly important.

Packaging efficiency must increase in order to offset continually rising labor costs, and anything which prevents perfect running of a packaging line adversely affects efficiency. We, as managers, must face the challenging need for ever-increasing efficiency, by providing well-trained mechanical personnel and the best equipment condition that is within our power and knowledge to obtain. (*End*)



3 **TITLE SLIP** is kept in visible record file. Red flag (F) indicates when equipment needs maintenance. Hole (A) has certain use: If card is in file, black spot (B) is seen through hole. If no spot appears, card is out for maintenance on that piece of equipment. If card is sent to maintenance department, yellow tag is put behind hole.

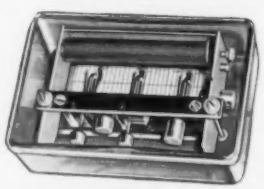




Impact-O-Graph is the key to *all* problems concerned with the movement and shipping of goods.

Further than that, it can provide the guide for proper product design in terms of the ultimate *use* of the product.

Thus Impact-O-Graph gives "Damaging Testimony" as to the extent to which the product stands up under normal "use" conditions—plus its ability to withstand shipping shocks to which it might be subjected.



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NSTC approved. Leasing arrangements available.

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THE IMPACT-O-GRAPH® CORPORATION
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WOW!

More and Better Cartons at Less Cost

We were in a real bind. More jobs coming in — on tougher stocks and finishes. Our glues didn't permit top production and gave less than 100% results. Customers and management complained. Then I called Findley. The resin folding box glue they recommended handles jobs we used to need a couple of glues to do; plus jobs we couldn't do before. Does them better and faster. And at a profit. Customers are satisfied. Management is happy. I'm a hero.

YOU CAN BE A HERO . . . with

Findley's INDUSTRIAL ADHESIVES exclusively

Dept. P.E., Milwaukee 45, Wisconsin

OWNED
&
MANUFACTURED
GRADE
COLOR
SHADE

The original Mr. Gross

If it's a new idea in shipping containers, the man they call 'Mr. Corrugated' probably had a hand in it.

TO TED GROSS, originality comes as naturally as breathing.

Ted has been applying his inventive gifts to corrugated box users' needs for 26 years. Currently he's Technical Advisor of Union-Camp's Box and Board Division. *Creative Director* might be a better description. Because Ted actually coordinates all the activities that go into the developing, designing and testing of a new corrugated container.

Remember the famous "V-Boxes" in World War II? They were developed when Ted was President of Container Laboratories. A task force under his direction worked closely with a special committee of the Fibre Box Association to produce the original wet-strength corrugated box. This development enabled military supplies to withstand the wet conditions of amphibious landings.

The widespread use today of lightweight, low-cost *produce* boxes also owes much to Ted's ingenuity. As Chairman of the Citrus Container Institute, he pioneered in developing corrugated boxes for shipping citrus fruits. The knowledge gained in this area has led to the widespread use of corrugated for shipping a variety of fresh produce—safely and economically.

Look at the instruments in our photograph. They're the special box gauges now being adopted as the standard for measuring the inside dimensions of a corrugated container. You guessed it. Another Ted Gross "first."

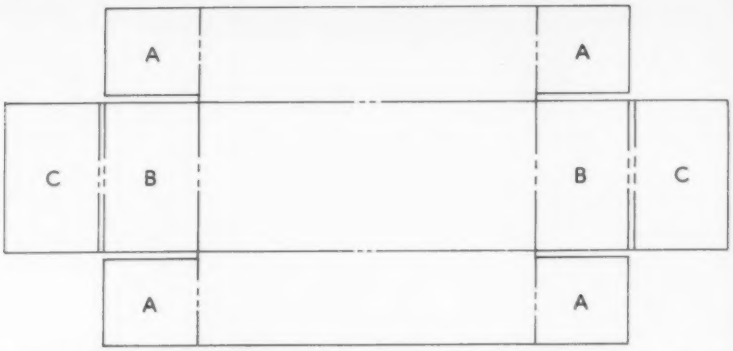
The original Mr. Gross' latest project is field testing new types of *bulk* boxes. They'll be used primarily for shipping granular products in lots weighing thousands of pounds. Imagine the savings this will effect over conventional handling methods!

What can Ted Gross and his staff mean to you in terms of greater shipping efficiency and economy? It costs nothing to find out. Union-Camp's comprehensive packaging service is available to all shippers. It includes equipment analysis, box design and development, specifications control, merchandising counsel and in-plant surveys of your materials handling operation.

A note on your letterhead will bring a prompt response. Why not write us today?

UNION-CAMP®
CORRUGATED BOXES
Union Bag-Camp Paper Corporation 233 Broadway N.Y. 7, N.Y.

Plants: Savannah, Georgia · Trenton, New Jersey · Chicago, Illinois · Lakeland, Florida · Spartanburg, South Carolina · Jamestown, North Carolina
Subsidiaries: Allied Container Corporation, Dedham, Massachusetts
The Eastern Box Company, Baltimore, Maryland.



1 **TWO-PIECE, FULL-TELESCOPE CORRUGATED BOX TOP** (and bottom) is set up automatically for packaging arc-welding rods, reducing hand packaging formerly required.

Partially mechanized, large-volume packaging pays off

By T. A. Seelos,
Plant Manager,
Welding Products Division,
A. O. Smith Corporation, Milwaukee

Arc-welding electrodes are typical of products not lending themselves to packaging on conventional units of automatic filling or closing machines. Still, a large producer of these items needs something more than merely manual methods. The operation Mr. Seelos reviews did not develop overnight and, as he points out, is ripe for modification in the near future. Even so, the extent of his company's experience with it offers a message to anyone faced with packaging an out-of-the-ordinary product: You can effectively unify manual techniques, tailor-made equipment, and structural package design.

You don't have to stick with hand packaging just because your product won't run on standard filling, closing, and other packaging machinery. We found this true in developing our packaging operation for arc-welding electrodes.

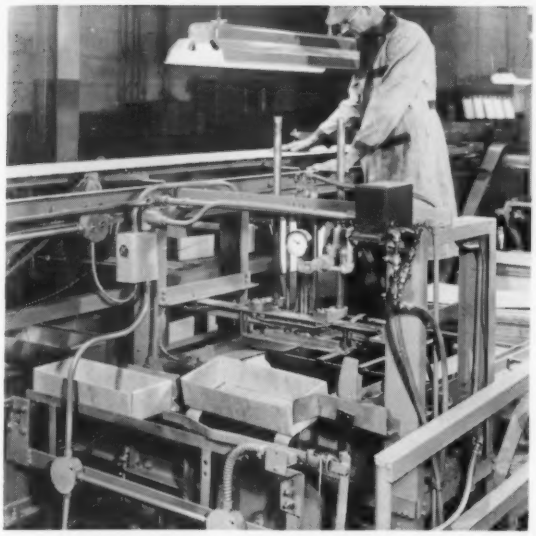
Reduce Hand Packaging

Installing automatic folding and set-up equipment for two-piece, full-telescope corrugated boxes in which we package our arc-welding electrodes, has reduced the amount of hand packaging formerly required. This has freed one operator from the packaging line to perform other necessary duties elsewhere in the plant. This means an increase in efficiency of as much as 30 per cent for our overall packaging operation. Because of the nature of some varieties of electrodes however, we still must use some hand filling.

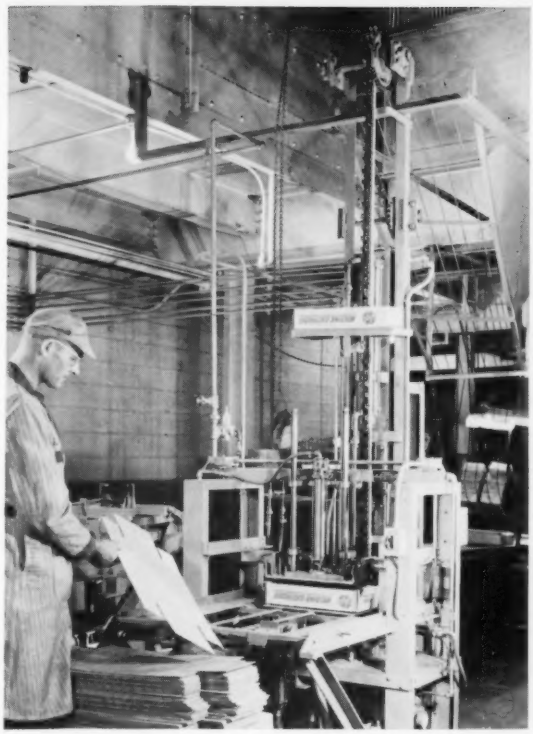
Problems Of Product

We make and package arc-welding electrodes in a variety of types and sizes. Depending on the nature and end-use of the product, there may be from 155 to 3,600 electrodes per 100 lb. This means that there will be from 78 to 1,800 welding rods per 50-lb. box, our usual weight of a package.

The electrodes are packaged at various temperatures depending on the manufacturing process and the final use of the electrode. The usual range of packaging temperatures is 150° to 200°F. We also package electrodes at temperatures above 200°F., and occasionally have had trouble with corrugated boxes



2 **AUTOMATIC EQUIPMENT** folds and sets up bottom half of two-piece box. One operator inspects rods and feeds blanks to two such machines—one for bottoms, one for tops (see Fig. 3). Man has right hand on continuous row of rods going to weighing station.



3 **OPERATOR FEEDS BOX BLANK TOPS** to folding machine. Note that set-up tops are conveyed upward to chute, then slide down to meet discharge conveyor from weighing machine (far right).

literally burning up in a pallet load because of the extremely high temperatures.

When it is necessary to package extremely hot electrodes, we frequently use metal cans instead of the corrugated boxes. We also use the metal cans for most military packaging purposes.

Why High Temperatures?

Why must we package electrodes at such high temperatures? To keep the moisture content of the electrode below 0.2 per cent. This is necessary because certain types of welding processes require electrodes with low moisture content.

We produce over 300 different types and sizes of electrodes. To package this extensive variety, we use eleven different sizes of corrugated boxes as initial or primary packages and, when necessary to use steel cans, three sizes of a round style and seven sizes of a square style. We also use two different sized corrugated boxes for outer packaging purposes, two sizes of pallets upon which the filled containers are stacked, and three pallet boxes (or shrouds for the pallets).

Use Two-Piece Corrugated Box

The corrugated container we use on our automatic folding and filling equipment is a two-piece, full-telescope style box. It is made of 300-lb. test, B-flute, virgin cylinder kraft. No special treatment is required on the board; the highly calendered, water-finish sheet provides all the necessary moisture protection for the electrodes.

We use three basic lengths of boxes, with varying cross-sectional dimensions. A 12-in. box holds 25 lb. of electrodes; the 14- and 18-in. boxes each hold 50 lb. of electrodes depending on the length of the given type rod to be packaged. Also, the different cross-sectional dimensions of the boxes are necessary to accommodate the different rod diameters. Thus, we always have 50 or 25 lb./box regardless of the product type.

Have High Stacking Strength

Although each filled box weighs 50 lb., its cross-sectional dimensions are not too great due to the density of the product. To get maximum use of our pallets, it is necessary to stack the boxes six layers high (ten boxes per layer). This means approximately 3,000 lb. of weight per pallet. Since we stack the pallets four high to utilize all available air space in our storage areas, a 12,000-lb. dead weight

Thomas A. Seelos is a graduate of the Penn State executive management program. He has been with A. O. Smith Corporation more than 20 years and is now manager of its welding products division plant in Milwaukee.

Fresh-Pact
BRAND
PREMIUM QUALITY
GREEN PEAS
WT. 1 LB. 4 OZS.
PREMIUM QUALITY
DISTRIBUTED BY PATTERSON FROZEN FOODS, INC., PATTERSON, CALIF.
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GREEN PEAS
2 FULL POUNDS
KEEP FROZEN
2 LBS. NET WT.
BIRDS EYE
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GREEN PEAS
CONTAINS SLIGHT AMOUNT OF SALT
2 lbs. NET WEIGHT . . . 10-12 Servings
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IQF-INDIVIDUALLY QUIC
EACH KERNEL INDIVIDUALLY FROZEN
POUR OUT WHAT YOU NEED
STORE THE REST
FLAV-R-PAC
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CORN
U.S. GRADE A FANCY
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NET WEIGHT 1 LB. 8 OZ.
Bel-air
Premium Quality
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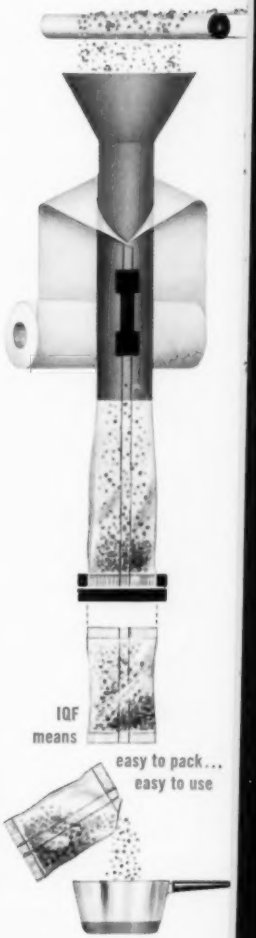
2 LBS. NET WT. golden corn

Frozen foods now go to market bagged in film of TENITE POLYETHYLENE



Pollock Paper Company, *division of St. Regis Paper Co., using Tenite Polyethylene, supplies bags like these to package individually quick frozen foods — a new development that's spurring frozen food sales.*

Transparent packaging of individually quick frozen food—known to the trade as IQF—is a giant step forward in frozen food merchandising.

IQF foods are not frozen into a solid block. Instead, each piece is individually frozen *before* packaging. Thus, housewives can buy IQF packages (usually one and one-half to two pounds) and pour out just the amount needed for a meal. Retailers benefit through larger unit sales; processors, through the economy of a simpler packaging operation.

Bags were chosen for IQF foods so that the user would have the convenience of a package that could be reduced in size as the contents were consumed. For the bag material, processors turned to film of Tenite Polyethylene. This Eastman plastic has proved ideally suited to the demands of the job.

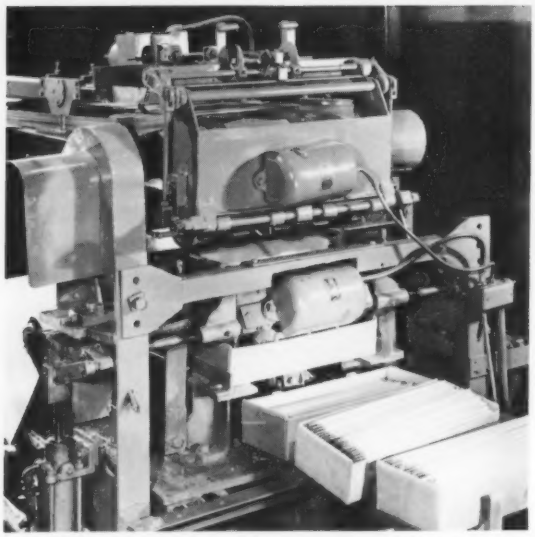
The film is strong, tough and flexible, and retains these qualities at below-freezing temperatures. Its performance on automatic filling machines reduces operating problems to a minimum. Strong seals, obtained with low sealing temperatures, increase package durability in shipment and in self-service cabinets.

Extruded on special equipment to assure accurate control of thickness, the film is supplied by Pollock in both bag and roll form to leading frozen food processors. These users report that it cuts costs by making possible unusually efficient machine operation with fewer broken bags.

For more information on the use of film of Tenite Polyethylene for frozen foods, write Pollock, or EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE®
POLYETHYLENE
an Eastman plastic

Film for frozen food bags extruded from Tenite Polyethylene by Pollock Paper Company; general offices, Dallas, Texas. Plants and sales offices located coast to coast.



4 **WEIGHING MECHANISM** (upper section of machine) weighs out approximately 50 lb. of electrodes which drop into formed bottom of box as it passes under filling mechanism (lower portion). Filled box bottoms emerge from machine on way to tying station.

5 **CHECKING WEIGHT OF EACH CONTAINER** takes place at point where filled bottoms and set-up tops come together (at left). After checkweighing and adjusting to exactly 50 lb., operator places cover on filled bottom preparatory to wire tying operation.

rests on the bottom layer of boxes on the bottom pallet. Thus, we must have sufficient strength in the boxes to support this load.

The tops and bottoms of this box are designed to have three thicknesses of corrugated board at either end of each piece when set up.

Thus, with the full-telescope style box, when it is completely filled and closed, we have six thicknesses of board at either end of the box.

A FULLY AUTOMATIC LABELER

(yet it has less parts than any semi-automatic machine on the market)

CONTINUOUS MOTION

Fully Automatic

LABELING MACHINE

GREATER FLEXIBILITY THAN EVER BEFORE POSSIBLE

PRODUCTION
variable speed drive from 40 to 150 per minute.

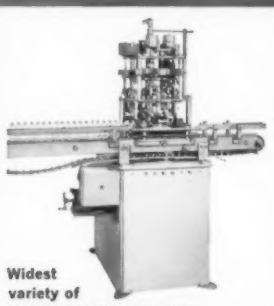
LABEL RANGE
"postage stamps" to 6" wide by 7" long.

LABEL MATERIALS
foil, paper, plastic, etc.

CHANGEOVER TIME
approximately 15 minutes

CONTAINER RANGE
1½" high by 1" diameter through 14" high by 7" diameter. Practically any shape.

Want to know more? Send for literature and list of users.



Widest variety of
LIQUID FILLING MACHINES

Fully automatic Overhead drive in vacuum, gravity and volumetric types. Models from 8 to 40 spouts handling all types of foamy and still liquids — for glass, metal or plastic containers from fractional ounce to gallons. Also semi-automatics and custom-engineered models.

mrm **mrm COMPANY, INC.**
191 Berry Street Brooklyn 11, N. Y.
Manufacturers of a complete line of fully automatic and semi-automatic liquid filling and labeling equipment.

With this two-piece box, we can over- or underfill to 50 lb. and still maintain the necessary compression resistance. This is because the six thicknesses of board alone are sufficient to support the load of 12,000 lb. should a box be underfilled. When the box is slightly overfilled, the welding rods take up some of the load, with no damage to the welding rods.

How Box Is Set Up

The six thicknesses of board at either end of the box result from the style of box blank we use and the method by which the boxes are folded and set up. (See Fig. 1.) The steps in folding are as follows:

1. After the sides are folded up perpendicular to the bottom, the end tucks (Panels A) fold inward.
2. Then the end flaps (Panels B and C) fold up perpendicular to the bottom and outside of the two end tucks.
3. Then Panel C folds inward and down over the end tucks (Panels A), locking them in place.

These operations are performed automatically by the folding equipment. Pressure and friction hold the ends in place; that is, the sides of both halves of the box provide enough pressure along the flaps to hold them in place by friction. After the electrodes drop into the bottom half of the container, the weight and length of the rods hold the end flaps (Panels C) securely in place.

Line Has Two Operators

The packaging line which has the automatic folding equipment requires two operators. One man feeds the box blanks one at a time to the folding and filling equipment. He takes care of both machines—one for folding the tops and one for the bottoms. (See Figs. 2 and 3.) This man also inspects the rods before they reach the weighing hopper.

The second man checks the weights of the filled containers and corrects them when necessary. He does this by hand, either adding or subtracting electrodes as required. As part of our product quality control, he checks the concentricity of the electrodes in each box. He stamps the cover piece (size and type of electrode information, manufacturer, weight of container, etc.) and places a cover onto the filled bottom half of the container. Tying the container with wire, he puts the filled container on the pallet, and places the corrugated shroud over the completely filled pallet.

The Packaging Operation

After the welding rods come from the manufacturing process, they move on a powered chain conveyor to a weighing station where they are weighed out in approximately 50-lb. lots. (See Fig. 4.) The rods are inspected before they reach the weighing station. The weighing operation is completely automatic and drops the rods into the bottom half of the corrugated box as it comes from the folding machine which was designed by Gaylord Container Div., Crown Zellerbach Corp., and built by W. R. Pabich Manufacturing Co.

After the bottom half of the box is filled and checkweighed, the top half is fitted over it. (See Fig. 5.) Our engineers designed and built this box-loading equipment.

Arriving at the wire tying station, the closed container is bound lengthwise and girthwise by a single strand of 18-gauge wire on a Gerrard automatic tying machine. (See Fig. 6.) This binds the box very tightly.

Use Corrugated Shroud

After tying the box, the operator stacks it on the pallet. The size of the pallet depends on the size of the container and the stacking pattern. Our engineering group works out the stacking pattern in advance. In most instances, the boxes are stacked six layers high with ten boxes per layer or 3,000 lb.

When a pallet is completely loaded, the operator places a cor-

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7 **CORRUGATED SHROUDS** cover pallets loaded with filled 50-lb. boxes of electrodes. Weighing approximately 3,000 lb., each pallet contains, in most instances, 60 50-lb. boxes (6 layers high, 10 boxes/layer). Shroud helps keep boxes positioned properly during shipment; also, protects appearance of finished package.

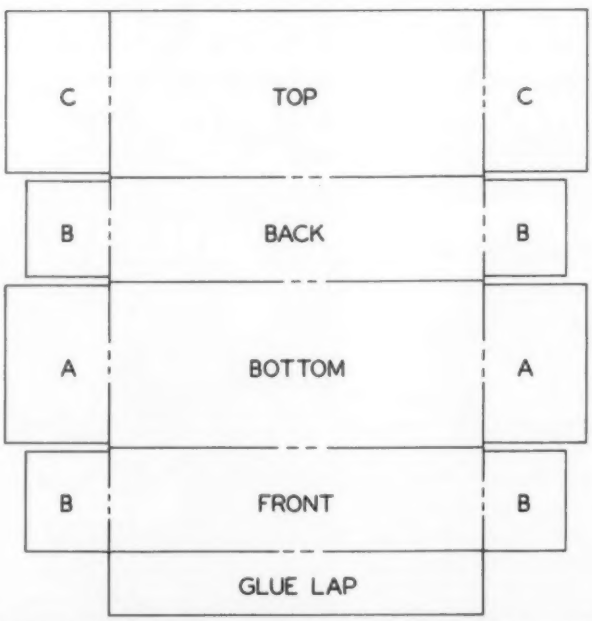
6 **AT TYING STATION,** operator ties closed container length- and girthwise, each direction with single strand of 18-ga. wire.

rugated shroud over the entire load. (See Fig. 7.) Although the filled and tied containers, when patterned and stacked properly, provide enough stability for the load, we use this shroud to help keep the boxes in proper position during shipment. Also, it protects the appearance of the finished package; the ultimate user receives it factory-fresh. It does not, however, add to stacking strength. Completely shrouded, the finished pallet is moved to the storage areas to await shipment.

Some Hand Packing Necessary

Due to the nature of several varieties of arc-welding rods, we must still package them by hand as they are not suited to our automatic packaging line. This operation requires one to six operators. One of them "fans" the rods out in his hands and inspects them before placing them into the corrugated container.

One man can fill a 50-lb. box of electrodes using as little as two



8 **FIVE-PANEL, WRAPAROUND, ONE-PIECE CORRUGATED BOX** is possibility for company to improve its packaging mechanization further. Due to design and method of folding end flaps, box will support heavy load of filled pallets stacked four high in storage.

handfuls. It takes a degree of manual dexterity to avoid dropping some of them when they are fanned out in the hand.

Look At One-Piece Box

Although the two-piece corrugated container we currently use is highly satisfactory, we are investigating the possibility of a one-piece styled box which we feel will further improve our packaging mechanization. This box is a five-panel, wrap-around, glue-joint corrugated box. It is made of the same type board as the two-piece box. (See Fig. 8.) When filled, it is glued at the ends.

Although this container will have only three thicknesses of board at either end, our tests show that it will stand up under the heavy load imposed by four pallet loads in a stack. This is due to the particular design and method of folding the end flaps. Also, the fact that the ends are glued, rather than being held merely by friction, adds to the stacking strength.

About the only drawback to this one-piece box is that it will require close filling tolerances. This is because we will have to keep a balance between the rods and the container so that both will provide support for the total load when the filled containers are stacked on the pallets in the storage areas.

Advantages

This style box, however, has definite advantages over our present two-piece box. First of all, it can be folded, filled, and sealed more efficiently than the two-piece container—because it will require less equipment and less handling during the actual packaging operation.

Inventory problems will be minimized in that we will not have to worry about keeping a balanced supply of tops and bottoms as we now do with the two-piece container. Inventory costs would be less, and less storage space would be required—approximately 35 to 40 per cent less—all resulting in a more economical operation.

Performance On Machine

We have investigated machinery to set up this one-piece box, and apparently there will be no problem involved from the standpoint of equipment for this operation. The way it will work is this: First, the front and back panels will be folded up (see Fig. 8) perpendicular to the bottom. The inside end panel (Panel A) will then fold up, and the end tucks (Panel B) will fold inward to meet at the center of the inside end, and will be glued in place.

After the box is filled, the top will be folded down over the product and be glued to the glue lap. Then the outer end panels (Panels C), which are a part of the top of the container, will fold down over the outside of the end tucks and will be glued in place. This closes the container securely and, incidentally, makes it quite pilferproof. *(End)*

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Robert W. Roop, a physics honor graduate of Princeton, received a Ph.D. in physics from University of Pennsylvania. His professional work includes five years of wartime Naval service in engineering design and equipment evaluation for countering under water acoustic weapons, and two years as a research associate and staff member at MIT. From 1948 to 1950, he was a senior physicist at Johns-Manville Research Center. As a project leader and later a group leader at Philco Corp. from 1950 to 1956, Mr. Roop was concerned with research and development problems, including weapon systems designs, data processing, and a development program for the Sidewinder missile. A founder of General Atronics, his work there has included consulting in data processing and information handling, and packaging operations and materials handling in factories and warehouses. A contributor to technical and trade literature, and to the *Crowell-Colliers Encyclopedia,* he is a member of Operations Research Society, Physical Society, Institute of Radio Engineers, and a Fellow of the Acoustical Society.

Millard M. Brenner was graduated from MIT in electrical engineering. He has taken graduate courses in mathematics and physics, and military courses in radar. At U.S. Army Signal Engineering Laboratories, Fort Monmouth, N.J., Mr. Brenner undertook development projects in ground data transmission, and originated the "Missile Master" system, providing central surveillance and control information for Nike. Manager of electronic products laboratory at Avion Div. of ACF, and chief, special devices group at Electronic Associates, Inc., between 1955 and 1958, Mr. Brenner was concerned with radar, aircraft instruments, information processing systems and industrial control systems. Joining Atronics in 1958, he is engaged in development of advanced military equipment, medical apparatus, and industrial control systems, including automatic parts counters, package selection systems, and controls for automatic warehousing operations.

Statistical fill control means cost savings

Three fundamentals—measurement, decision, control—to consider in any filling operation. How does cost of doing these compare with cost of *not* doing them?

By Robert W. Roop, *Vice President,*
and Millard M. Brenner, *Staff Engineer,*
General Atronics Corporation,
Bala-Cynwyd, Pennsylvania

Significant savings can result from a properly controlled filling operation. Pointing out three fundamentals which must be considered, the authors discuss fill distributions and limits, standard distribution, and choices the packager has, whether fill is measured by weight, volume, height, or number. Using typical examples, including illustrative curves, they show how an operation can be controlled and how such control can result in effective savings for the packager.

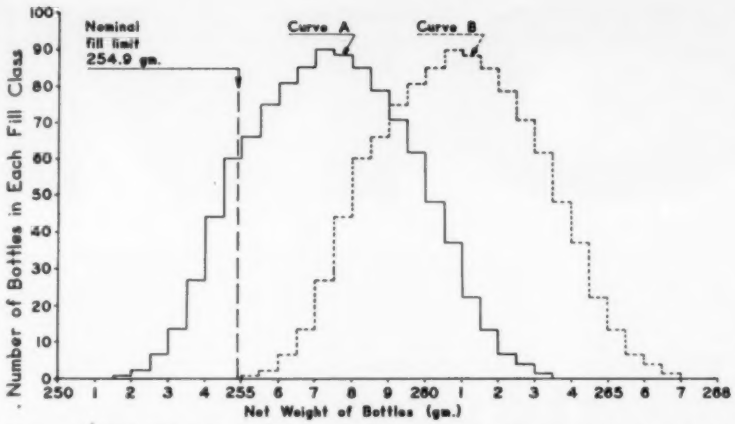
It is not obvious, off-hand, that package filling involves statistics. To those who have been through it, however, it does become clear that understanding some of the basic ideas of statistics and applying them to package filling can result in significant savings.

In thinking about any package filling situation (whether putting soup into cans or bolts into boxes) there are three fundamental operations that must be considered. These are: Measurement, decision, and control. To be practical and businesslike, we must also be concerned about the costs of performing these operations, and compare these with the costs of not carrying them out.

MEASUREMENT OF FILL

Usually, one of four quantities is used as a measure of fill. These are: weight, volume, height, or number (in the case of packages containing individual pieces).

For high speed packaging operations, it is clearly necessary to have an automatic instrument capable of sensing the appropriate quantity



1 FILL DISTRIBUTION (Curve A) of 1,000 bottles of liquid shampoo. Note: About 13 per cent fall below *nominal* weight and packager runs significant risk of being cited for underfilling. Moving distribution center high enough above nominal limits, so that no cases fall below it (Curve B), gives zero risk though it may increase cost due to additional overfill.

for each container at rates from a few packages per minute to as many as several hundred. This is the first step toward realizing the benefit of statistical fill control.

What Transducers Are

In the language of electronics, an automatic measuring gadget which delivers the results of its measurements in the form of an electrical signal is called a transducer.

There is a wide variety of transducers, since the term is rather general. One kind of fill transducer, for example, might be an electronic scale for measuring the weight of each bottle of detergent as it leaves the filling machine on a conveyor line. In this case, the weighing transducer generates an electrical signal proportional to the weight of the bottle plus the contents.

Another kind of transducer might be a photoelectric device placed at a certain height above the base of the table of a filling station. In such an arrangement, when the fill height rises above the height of the optical slit, the height instrument could produce a signal that would stop the filling process.

For a filling operation involving individual parts, a piece-number transducer might be one in which a photoelectric eye generates an electrical pulse each time a piece passes the viewing station, and an electrical counter generates a control signal every time a certain number of pulses have come from the photo-cell.

One of the facts of life about package filling is that, for a sufficiently sensitive transducer, no two packages will have exactly the same degree of fill. With modern electronic techniques, it is almost always possible to detect and record a spread or distribution of the measured values of individual fills around the average fill value. Even though the spread may be small, it can have quite significant economic effects in high volume production.

FILL CONTROL SYSTEMS

From the few examples of transducers described, it is easy to see that there are a great many different ways in which fill can be measured and in which these measurements can be used. This fact emphasizes the need for an analysis of the objectives which can be achieved by fill control.

At Least Two Basic Types

There are at least two basic types of fill control systems which differ from each other in what they are designed to accomplish. In some cases, such as filling liquor bottles, there are severe penalties for not meeting a fill limit, e.g., by underfilling. To be adequately protected against these penalties, the producer tries to insure that every bottle leaving his line has been inspected and found adequately full. In this case, action resulting from the fill measurement of an *individual* bottle is applied to that bottle. Any underfilled package must be removed from the line and corrected. This sort of action is characteristic when there is a "hard" limit on fill that *must* be satisfied.

On the other hand, there are also "soft" limits on package filling. These apply more often to overfilling than to underfilling. A soft limit is one in which there is no sharp cut-off or threshold, but rather the penalty becomes gradually more severe as the departure from the norm becomes greater. Overfilling a bottle is not prevented by law. It is undesirable only because the producer is spending extra product with each overfilled package.

With a soft limit, either for underfilling or overfilling, corrective action is not necessary for each individual container. No great harm is done if a few packages leave the line either underfilled or overfilled, *provided* remedial steps are taken soon enough so that most of the packages fall within the desired fill limits.

Steps In System Design

The system design of fill control equipment consists of the following steps:

1. Establishing the desired measure of fill (such as weight, height, volume, or number of pieces).
2. Determining the acceptable limits of fill, both for underfilling and overfilling.
3. Examining the costs of uncontrolled filling by finding out how frequently the normal fill limits are not satisfied and the cost of the average fill limit failure.
4. Selecting the kind of action to be taken (e.g., *individual* correction for a hard limit or correction of the *average* for a soft limit) when the measured fill falls outside the normal range. *(Turn page)*

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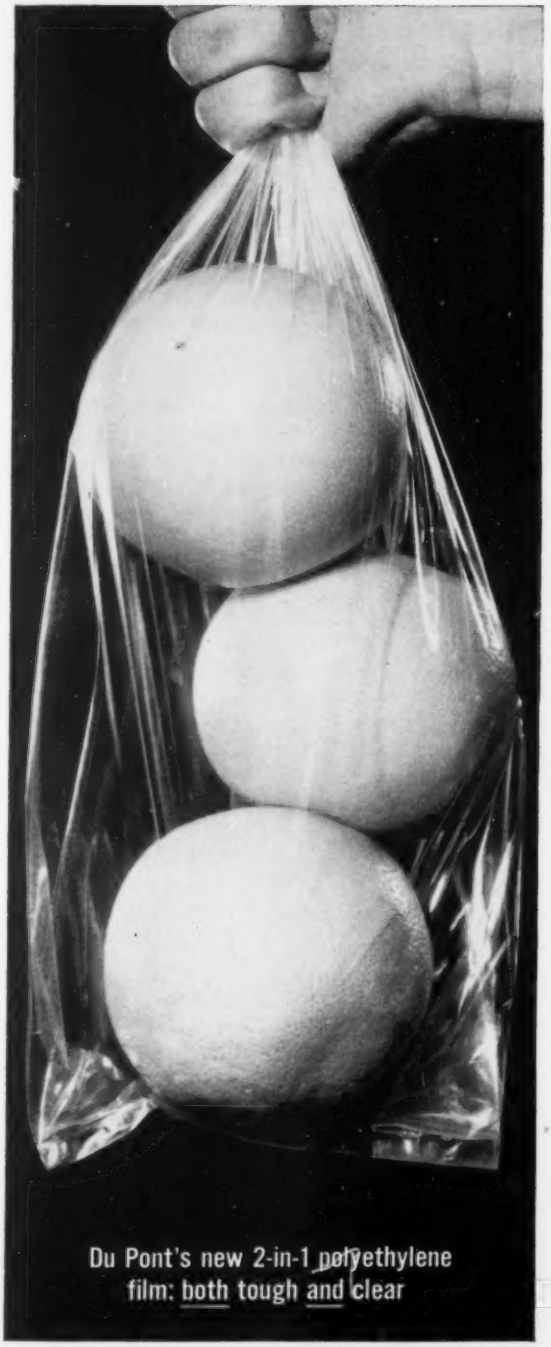
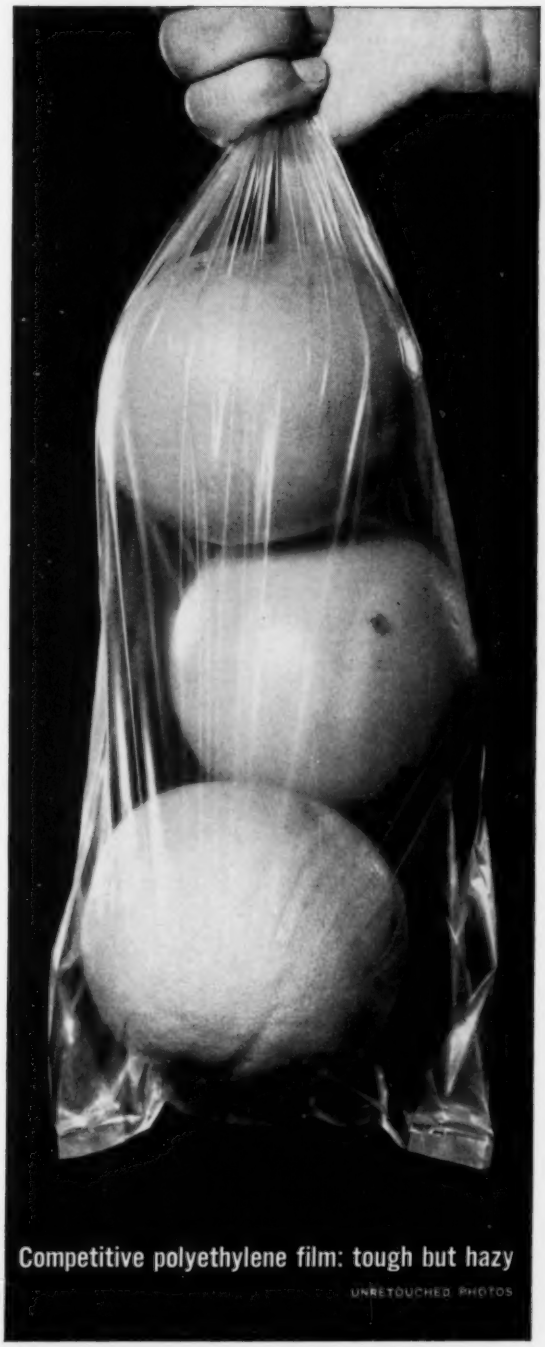


Du Pont's new 2-in-1 polyethylene film: both tough and clear



Competitive polyethylene film: tough but hazy

UNRETOUCHED PHOTOS

5. Estimating the cost of providing fill control with a satisfactory accuracy to satisfy the normal limits in "most" cases.

6. Comparing the costs of providing fill control with the costs of not controlling fill.

By following these steps it is often possible to arrive at a conclusion about the desirability of installing improved fill control in a packaging operation.

FILL DISTRIBUTIONS, LIMITS

Suppose we use an accurate scale to measure the net weight of 1,000 7-oz. bottles of liquid shampoo. A volume of 7 fl. oz. of water weighs 207.016 gm., but the shampoo is denser than water, so that exactly 7 fl. oz. of the product weighs 254.9 gm. The thousand weighings are carried out to the nearest 0.1 gm., and the results of the thousand measurements are grouped together in classes, each spanning an interval of 0.5 gm. The results of this hypothetical experiment are shown in Fig. 1, Curve A.

From this curve, we can see that about 13 per cent of the cases fall below the *nominal* weight limit, while 87 per cent are above. The *average* net weight is between 257.0 and 257.5 gm., or about 2.5 gm. *above the nominal weight*.

Risk Can Be Significant

If 250 gm. of product cost $0.20 to produce, then each gram costs $0.0008. If the yearly production is five million bottles, the annual cost of the overfilling is $10,000. However, in spite of this considerable cost for excess product, the producer runs a significant risk of being cited for underfilling since a significant fraction of his packages are in fact *below* the standard.

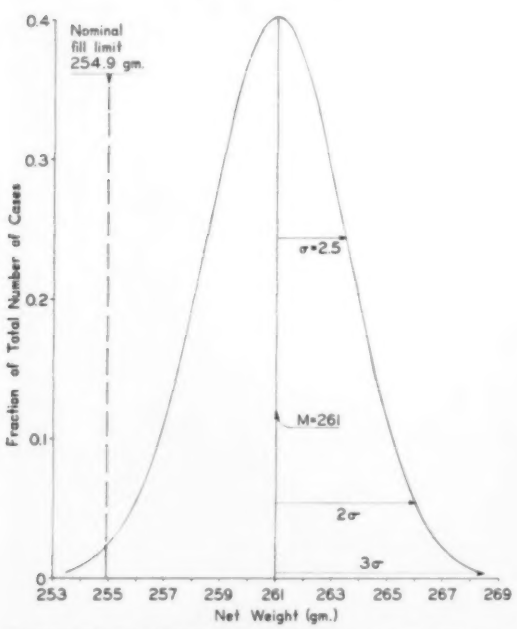
Three Courses Of Action

Depending on the likelihood of legal penalties and the past experience of the producer, he may choose any of three courses of action. The first possibility represents the "calculated risk" point of view. In this case, the gambler-producer decides that, with a certain percentage of his output, he will take a chance on customer complaints or court countermeasures. A chancy kind of person might be willing to let several per cent, or possibly as many as 10 per cent of the distribution fall below the nominal limit.

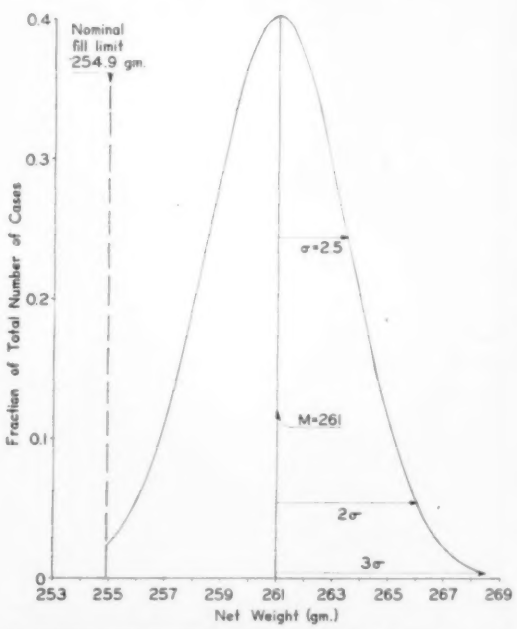
A more conservative personality might feel that he should move the center of the distribution high enough above the nominal limit so that none of the cases in Fig. 1, Curve A, would fall below it. Looking at this curve, he might figure that increasing the average bottle filling to 260.0 gm. would leave him with a clear conscience and zero risk, even if it cost an extra $10,000 or so per year in additional overfill. This possibility is shown by Curve B in Fig. 1.

Actually this conscientious producer is statistically naive to believe that he can buy truly zero risk for only $10,000 per year. The point is that both curves in Fig. 1 show the distributions for *only* 1,000 measurements, which are a very small fraction of the entire million bottle output.

If the entire population of 5,000,000 bottles were measured, the concatination of normal errors would practically insure that a few



2 STANDARD DISTRIBUTION CURVE can describe filling errors. If packager accepts normal accumulation of filling errors, it must move average fill value well beyond nominal limit to avoid appreciable fraction of output falling below limit. Results: Overfilling most packages to avoid having more than few underfilled.



3 TRUNCATED DISTRIBUTION has effect of changing normal distribution by removing all instances falling below nominal limit. (Note: curve ends at nominal weight.) But this means packager must inspect each package individually, and remove and refill all which are below nominal limit, resulting in increased costs.

of these bottles would be significantly more underfilled than the lowest bottle shown in Curve A, Fig. 1. This situation is represented by the standard distribution curve, shown in Fig. 2, which applies to normal errors in very large populations, and can also be used to describe package filling errors.

Standard Distribution Curve

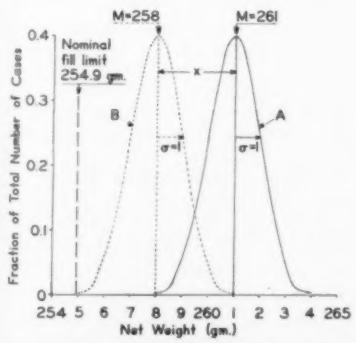
As illustrated in Fig. 2, the standard distribution curve needs two numbers to describe it. The first is the *mean*—the location of the peak of the curve on the numerical scale used as a measure of fill. The second number used to describe a standard distribution curve refers to the half-width of the peak, and is called the *standard deviation*, or the sigma (written σ), of the distribution. The width of the peak is 2σ between the two points which are down from the peak by a factor of 0.609 as shown in Fig. 2.

It is characteristic of the standard distribution curve that its value one σ away from the center is 0.609 times the value at the peak; the corresponding 2σ value is 0.1165; and the similar 3σ value is 0.011.

Of the total number of cases 31.7 per cent fall outside the $\pm$ 1σ limits, 4.6 per cent fall outside the $\pm$ 2σ limits and 0.26 per cent of the cases fall outside the $\pm$ 3σ limits.

PACKAGE-FILLER'S CHOICES

These facts about the standard distribution curve make clear the dilemma which faces the conscientious producer we considered earlier. If he accepts the normal accumulation of filling errors, he finds it necessary to move the average value of fill well beyond the nominal fill limit—far enough so that the peak of the distribution is at least 2σ above the limit—in order to avoid having an appreciable fraction of the output falling below the limit. This means that most packages have to be overfilled in order to avoid having more than a few underfilled. As we have seen, this can be quite expensive, especially in the case of large volume production.

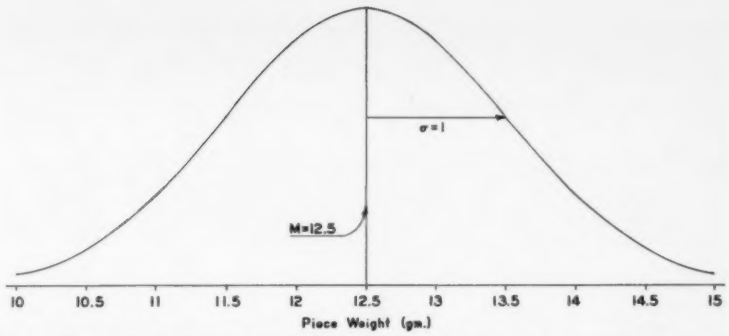


4 AUTOMATIC CONTROL can reduce width of curve. Average overfill can be reduced without raising underfill risk (Curve A). Distribution (B) with small σ has peak closer to limit, reducing amount of overfilling.

A Truncated Distribution

Aside from the unattractive possibility of seriously overfilling most packages, the producer has two other choices, which can be illustrated by modifications of the distribution curve shown in Fig. 2. One possibility is to inspect each package individually and remove and refill all those which fall below the limit.

This has the effect of changing the normal distribution curve by removing all those cases which fall below the limit, as shown in Fig. 3. A distribution curve like this is called a truncated distribution. If a refilling operation is undertaken, the producer will still probably want to keep the mean of the filling distribution somewhat above the limit, unless he is willing to accept the cost of refilling half of the packages.



5 DISTRIBUTION CURVE FOR WEIGHTS of individual non-identical pieces is likely to be quite large, possibly covering weight range of 2:1. Note that smallest increment of weight, which can be added to nearly full package, is weight represented by low end of curve.

Can Reduce Value Of Sigma

The remaining possiblity available to the producer is to identify and provide automatic control for some of the sources of filling errors. This general approach, if successful, has the effect of reducing the width of the distribution curve or cutting down the value of σ.

To the extent that filling errors can be controlled and the standard deviation reduced, the average overfill can be reduced without increasing the risk of underfill. Fig. 4, Curve A, shows a standard distribution curve which illustrates the effect of automatic control of filling errors by a reduction of the σ value of the distribution. In Fig. 4, note how a fill distribution curve with a small σ can have its peak value moved closer (Curve B) to the fill limit, thus reducing the average amount of overfilling.

As we have pointed out earlier, small differences in the average amount of fill can result in large cost savings when large volume runs are involved. For example, the difference between the distributions of the two curves in Fig. 4 represents a saving of $12,000/yr., when applied to 5 million packages containing a product which costs $0.0008/gm.

PARTS COUNTING

Most of our discussion has been about filling liquid containers. These same considerations apply just as well to packages of granular solid material which can flow

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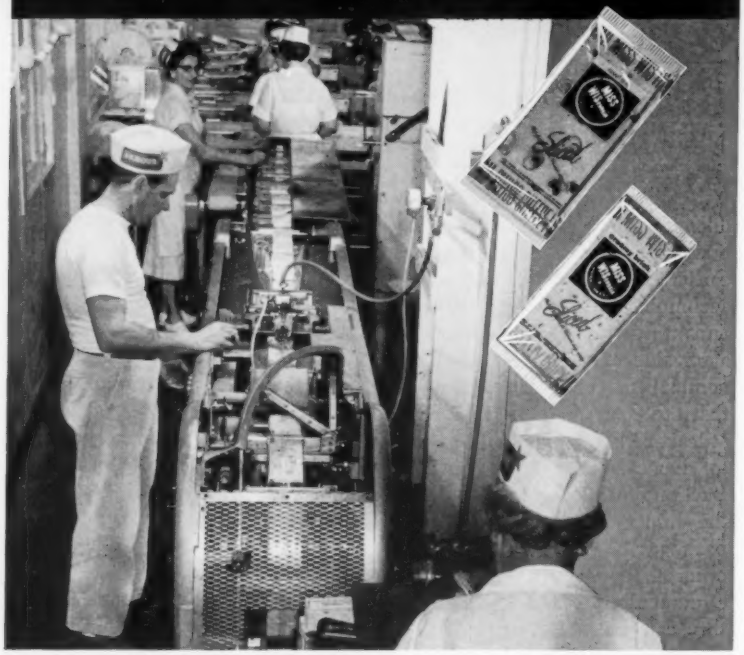

Above: Typical installation of the Hayssen RT at the Monroe, Wisconsin plant of Armour Cheese. This newly installed machine packages sliced Munster, American and Swiss cheeses in six ounce packages directly from roll stock. The machine forms a hermetically sealed, gas-flushed package.

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more or less like a liquid. Those products which occur in the form of separate parts or pieces deserve special consideration.

Have Less Control Over Fill

Some products which occur in pieces are usually packaged by weight instead of by count. This occurs, for example, in the case of non-identical units, such as pieces of bubble gum or salt water taffy. In such cases, most of the discussion which applied to liquids also applies. The principal difference is that, since the product is not divisible, the producer has less control over the fill distribution function than he has in the case of a liquid or finely granulated solid.

Measurements of the weight of a large number of individual, non-identical pieces give a distribution curve for the weights of the pieces. For pieces of salt water taffy, the spread of the distribution is likely to be quite large, possibly covering a range of two to one in weight. A distribution curve of this type is shown in Fig. 5.

In Fig. 5, we can see that the smallest increment of weight which can be added to a nearly full package is the weight represented by the low end of the piece-weight distribution curve. Suppose the non-identical pieces for a single package are chosen at random and are used one at a time, to fill the package until a weighing transducer indicates that the weight limit has been satisfied. Under these circumstances, the distribution of net package weights will be *above* the weight limit by at least half of the mean value of the individual piece distribution.

Using Pre-Weighed Pieces

One way to improve this situation is to stop filling the package with randomly selected pieces slightly below the weight limit and to add the last piece or pieces non-randomly. This is done by choosing the last piece to be one which will just make up the deficit in weight. Such a piece can be chosen

Cigarette carton closing at P. Lorillard Company, Inc. where the advantages of Thermogrip adhesives were realized almost two years ago.

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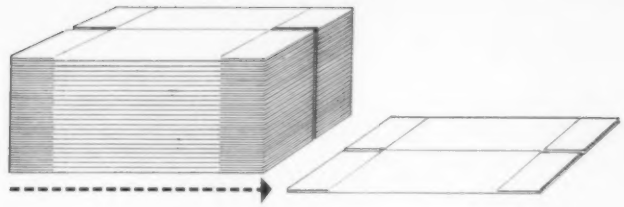
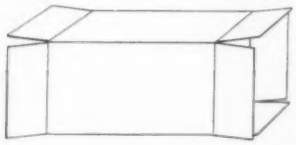
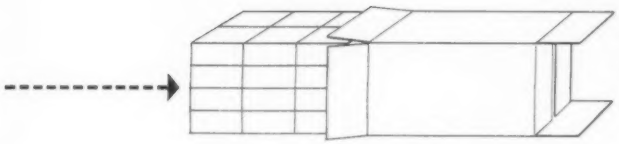


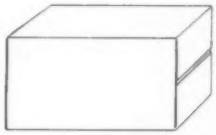
STRIPS OFF FLAT CASE



OPENS IT



PRESENTS IT FOR LOADING



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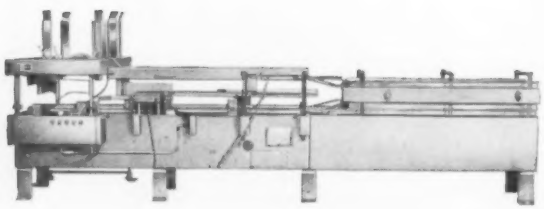

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EMHART

from a stock of pieces which have been previously sorted by weight. In this way, the *average overweight* of the filled packages can be reduced.

COUNTING IDENTICAL PARTS

For parts such as screws, nuts, bolts, and the like, the producer tries to produce identical and interchangeable pieces. Such products are often packaged by count instead of by weight.

Control By Weight Uncertain

Actually, even the most highly mass-produced items have a small, but detectable, distribution of the weights of individual parts. This fact is responsible for the procedure, used by some producers, of packaging by count instead of by weight.

Suppose, for example, there is a 1-per cent uncertainty in the weight of an individual part. In a lot of 200 parts, the uncertainty in the weight of the whole lot is *twice* the average weight of one piece. If the number of individual pieces is very large, or if the value of the individual pieces is high, it is clearly unsatisfactory to try to fill packages by measuring the net weight of the filled package.

Two Ways To Overcome Problem

There are two ways of overcoming this difficulty. Perhaps the most obvious is to provide a counting transducer which enumerates the parts as they proceed Indian-file through the sensing equipment. This arrangement has the disadvantage of being slow since a one-by-one arrangement of the parts is required. Optical counting also suffers from the disadvantage that parts with holes, or which are capable of overlapping, tend to confuse the transducer.

The second approach to parts counting is to conduct sequential batch-weighing operations, using batches which are small enough so that the weight uncertainty of each batch is significantly smaller than the smallest weight of one part. In this way, weighing errors do not accumulate throughout the entire lot, but are rounded off correctly by dividing the entire lot into sub-lots which are limited in their maximum size. In this way, a count with zero uncertainty can be obtained quickly. Parts counting equipment making use of this principle is now available.

CONCLUSIONS

Not all packaging engineers consider statistical analysis to be an essential tool of their trade. Nevertheless, a basic familiarity with the ideas of distribution functions and the analysis and control of filling errors offers the possibility of considerable saving during packaging operations. Typical principles for saving money in package filling:

1. Controlling overfill so that the *mean fill value* can be brought closer to the limit, and
2. Counting by batch weighing with a limitation on maximum batch size to prevent accumulation of errors. *(End)*

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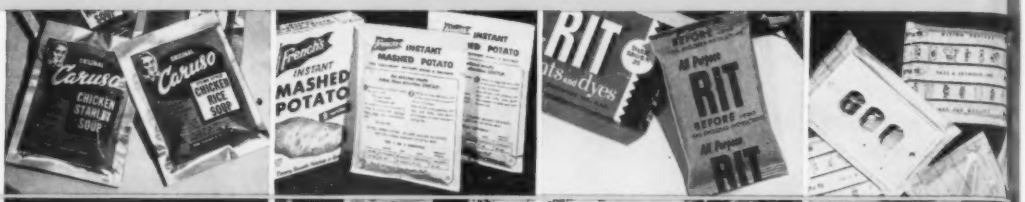

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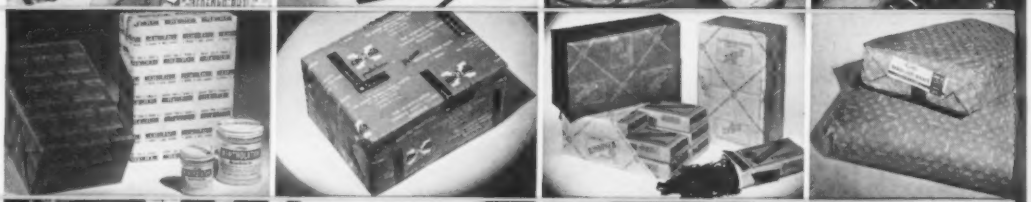

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Part II—Applying standard evaluation methods to a typical packaging problem: The possibility of a new packaging plant

Pick your projects for profit—using economic evaluation

By Edward M. Krech, Jr.,
Winton Hill Technical Center,
The Procter & Gamble Company,
Cincinnati

A practical application of standard evaluation methods to a typical packaging problem involving capital expenditures concludes this two-part article. Illustrating his discussion by the use of equations, Mr. Krech sets up the problem, shows preliminary calculations, and then explains how the problem can be solved by such methods as: payout period, present worth, and return-on-investment method.

What are some of the more standard evaluation methods which can be applied to packaging and package engineering decisions? From the previous sections, note that we can take several different approaches to the economic evaluation problem. Going further, each one of these approaches has a great many minor variations. Apparently, the most fruitful comparison would be gained by examining each general method in the light of the criteria we have developed.

STANDARD EVALUATION METHODS

To clarify the explanations, an example of a typical packaging problem is worked out by each method. In addition, the various solutions illustrate exactly how much of the available information is used to advantage, and point out the widely varying results obtained with each method.

The Problem

Assume you have been asked to evaluate the possibility of a new packaging plant using a high-speed carton filler and sealer. You know:

1. Engineering and construction cost estimates show that this small plant can be constructed for an initial depreciable investment, including machinery and buildings, of $50,000.
2. Land and other recoverable investments will total about $30,000, and working capital plus inventories of $20,000 will be required.
3. The company estimates that the plant will operate for only ten years before being liquidated, and permission is received to depreciate it fully in that time.
4. Forecasts show further that annual sales of $180,000 can be expected for the first six years; cost of goods sold, including allowance for depreciation, expected to be about $140,000 per year.
5. After six years, sales will drop to about $130,000, and cost of goods sold to $100,000 per year.
6. A tax rate of 52 per cent is to be used.

Preliminary Calculations

Prior to making the evaluations, we must make the following preliminary calculations:

1. Subtracting cost of goods sold from sales shows a predicted gross profit of $40,000 for the first six years, and $30,000 for the final four.
2. Multiplying these by the complement (0.48) of the tax rate gives a $19,200 net profit for those first six years, and $14,400 net profit for the last four years.
3. The only remaining arithmetic at this point is the calculation of the annual depreciation allowance: A $50,000 investment depreciated in a straight line for ten years obviously means an allowance of $5,000 per year.

Keep in mind that this example is just one of many types of economic investment problems. Merely by changing the label, $50,000 buildings and machinery investment, to cost of a new automatic packaging line to replace a manual operation, and re-naming the profit figures as savings in labor, will present a typical machinery justification problem. All

the solutions that follow will still remain exactly the same.

PAYOUT PERIOD

The payout, or payback, period approach is one of the oldest and most common methods in use. In its basic form, it is extremely simple, although there are variations that become a little more complicated.

Briefly, payout period, normally expressed in years, is the *time required for the profits, or savings, resulting from an investment to add up to, or pay back, the value of that investment.* Thus, ignoring taxes, an investment of $90, that produces a profit of $30 per year, has a payout period of three years. Expressed as an equation, the simplest form of payout is:

$$\text{Payout} = \frac{\text{Original fixed investment}}{\text{Average yearly profit or savings}}$$

or, in our example,

$$\text{Payout} = \frac{\$50{,}000}{\$40{,}000}$$

$$= 1.25 \text{ yr.}$$

Actually, this grossly oversimplified form is seldom used by any but the most naive companies. More sophisticated versions specify that the profits are *after* taxes, and make provision for including the effects of depreciation. The equation then becomes:

$$\text{Payout} = \frac{\text{Original depreciable fixed investment}}{\text{Profit after taxes} + \text{Average yearly depreciation}}$$

$$= \frac{\$50{,}000}{\$19{,}200 + \$5{,}000}$$

$$= 2.06 \text{ yr.}$$

The equation now takes account of the fact that part of the investment is made up through depreciation accruals.

Also, working capital and recoverable investments can be included in the numerator. The argument against this is that these investments are recoverable at any time and, therefore, need not be paid back through profits. Nevertheless, they do represent an investment in "money-time" by the company and, for this reason, it may be better to include them. An investment low in depreciable items, but high in working capital and land requirements, would otherwise look disproportionately good.

Effect On Time Value Of Money

Payout times can be calculated on the results of a year-by-year forecast of future earnings and expenses. This is an advantage since the time value of money will usually be reflected to a certain extent.

If profits are exceptionally high in the early years, the project will show a shorter payout period than if the reverse were true. However, if profits are high in the early part of the payout period, but drop off at a rate such that the average over the period is equal to the average of a competing project with stable profits, the advantage of the former project due to the time value of money will not show up.

For example, two projects with a payout of eight years, one having $8,000 profits the first year decreasing in straight line to $4,000 the eighth year, and the other having equal annual profits of $6,000 would, as indicated, have the same payout. Yet the first returns the larger part of the investment in the early years, and is thus preferred on the basis of the time value of money. Therefore, note that this method gives far from a dependable reflection of money's time value.

Does Not Show Project Worth

Another disadvantage of the payout-time approach is that it gives no indication of the worth of the project after the payout period is passed. This is a particularly notable fault in those cases where a fairly short payout is involved. If the choice is between two projects with a payout of three

TABLE

FACTORY CONSTRUCTION EVALUATION

I. Initial total investment = $100,000.

II. Cash flow forecast

A. Net-cash-earnings calculation:

Years	Cost of Goods Sold	Sales	Gross Profit	Net Profit	Depreciation Cash Earnings	Net Cash Earnings
1 to 6	$140,000	$180,000	$40,000	$19,200	$5,000	$24,200
7 to 9	100,000	130,000	30,000	14,400	5,000	19,400
10	100,000	130,000	30,000	14,400	5,000	69,000*

*Includes $50,000 from recoverable investments.

B. Present-worth calculation:

Year	Present-Worth Factor @ 25%	Present Worth @ 25%	Present-Worth Factor @ 24%	Present Worth @ 24%
1	0.888	$21,500	0.892	$21,600
2	0.710	17,200	0.719	17,400
3	0.569	13,800	0.580	14,000
4	0.454	11,000	0.467	11,300
5	0.364	8,800	0.378	9,200
6	0.291	7,000	0.304	7,400
7	0.233	4,500	0.245	4,800
8	0.186	3,600	0.198	3,800
9	0.149	2,900	0.159	3,100
10	0.119	8,300	0.129	9,000
Totals		$98,600		$101,600

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years, what happens after that time can have considerable significance.

REVISED PAYOUT PERIOD

A newer modification of payout period is the "payout-time-including-interest" method. It recognizes that management expects far more from a project than merely having the investment repaid; it expects a certain minimum rate of return as well. Payout-time-including-interest method is the *time required for profits to earn back the original investment plus interest on this investment over the payout period.* Thus,

$$\text{Payout} = \frac{\text{Original depreciable fixed investment} + \text{Interest}}{\text{Profit after taxes} + \text{Average yearly depreciation}}.$$

Substituting the values given in our example, assuming required interest on the investment at 20 per cent, and working the problem by trial and error,

$$\text{Payout} = \frac{\$50{,}000 + 3.4\ (\$10{,}000)}{\$19{,}200 + \$5{,}000}$$

$$= 3.4 \text{ yr.}$$

The interest charged to the investment is again much larger than "bank loan interest." It should at least equal the rate of return being earned by other projects.

Emphasizes Money's Time Value

The result of this modification is to put increased emphasis on the time value of money. As a procedure, it is certainly worthy of consideration in some cases where those projects being evaluated are not particularly complicated from a cash-flow standpoint.

RETURN ON INVESTMENT

Widely used by engineers, the return-on-investment method of economic evaluation was developed before a great deal was known about the field. As a result, it leaves something to be desired.

Using *Original* Investment

In its basic form, this method is expressed as *the ratio of average annual profits to the total original investment plus working capital.* Thus,

$$\text{Return on original investment} = \frac{\text{Average annual profit}}{\text{Total original investment} + \text{Working capital}}$$

$$= \frac{\frac{\$19{,}200\ (6) + \$14{,}400\ (4)}{10}}{\$80{,}000 + \$20{,}000}$$

$$= 17.3\%.$$

Its biggest advantage is its simplicity and ease of understanding. Unfortunately, this simplicity results in considerable sacrifice of its comprehensiveness and accuracy as an indicator.

Is Not Realistic

The principle disadvantage is its utter failure to make any allowance for the time value of money. If earnings, expenditures, and all other cash flows are virtually the same every year for all projects considered, this is not an important objection. However, this is rarely the case, and as soon as the cash flows *do* vary from year to year, this method becomes unrealistic.

Change To *Average* Investment

In addition, when basing the rate of return on original investment, depreciation is not taken into account. This is partially corrected by altering the equation to use the average fixed investment as a base. Known as the "average-book-value" method, the equation now reads:

$$\text{Return on average investment} = \frac{\text{Average annual profit}}{\text{Average fixed investment} + \text{Working capital} + \text{Recoverable investment}}.$$

The average fixed investment is calculated by dividing the sum of the investment remaining on the books each year, by the total number of years of the life of the project. Thus, for our packaging plant problem,

$$\text{Return on average investment} = \frac{\frac{\$19{,}200\ (6) + \$14{,}400\ (4)}{10}}{\$25{,}000 + \$20{,}000 + \$30{,}000}$$

$$= 23.04\%.$$

While this method partially allows for depreciation, it does not do so in a realistic manner. Assuming straight-line depreciation, the *average* fixed investment is one-half the *original* fixed investment.

Distorts Relationship

By examining the equation, note that this 1:2 ratio between the influence of fixed investment and working capital plus recoverable investment penalizes an investment with high working capital and recoverable investment far more than should be the case. An investment classified as all *fixed* investment would produce *twice* the rate of return as one that is all recoverable investment. This is quite unrealistic. Furthermore, the relationship between investment and expense money is distorted.

As with the rate of return-on-original-investment method, there is no allowance for the time value of money.

Exaggerates Rate Figures

Finally, there is apt to be confusion with both return-on-investment methods, with interest rates charged for borrowed money. The fact that one of these methods may show a 30-per cent rate of return does *not* mean that money could be borrowed at 30-per cent interest and have the project break even. The return-on-average-investment method particularly results in exaggerated rate figures.

(Turn page)

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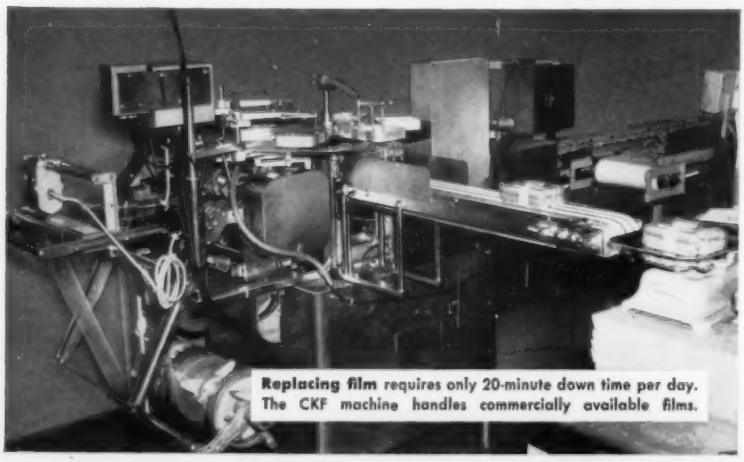

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PRESENT WORTH

In an effort to overcome the limitations of the older traditional systems of evaluation, the present-worth method was developed. It is *the ratio of present worth of total net project earnings to total investment plus working capital.* Expressed as an equation, this system is:

$$\text{Present-worth ratio} = \frac{\text{Present worth of total net project earnings}}{\text{Total investment} + \text{Working capital}}.$$

Lists Significant Cash Flows

The real basis of this method is a complete listing of all significant cash flows involved in the project for each year of its life. These cash flows are reduced to a net project earnings figure for each year. Then, these final annual earnings totals are brought forward, or discounted, to their present worth, using standard present-worth interest tables.

If the ratio of the present worth of these annual earnings to the total investment plus working capital of the project is *equal to one,* the project will earn *exactly* the interest rate used to discount the earnings. If the ratio is *greater than one,* it will earn a higher rate; conversely, if *less than one,* a lower rate. The interest rate used in the tables is normally the minimum rate of return acceptable to the company from an undertaking.

Shows Factors In True Light

The advantage of this method is that it permits the inclusion of virtually all economic factors which might affect a project, and does so in such a way that they are given their correct relative emphasis. This includes a full allowance for the time value of money, something the previous methods do not include. Items like depreciation, taxes, working capital, and salvage value are exposed in their true light.

Finally, the results have an added significance because the interest rate used in the present-worth tables is a true interest rate. It is comparable with the cost of borrowed money.

Computations Quick And Simple

The first howl of protest that goes up is usually against the calculation time to solve the present-worth computations. Annual earnings from a project extending over a ten-year period can be discounted forward in about two minutes. Worth a protest? Hardly.

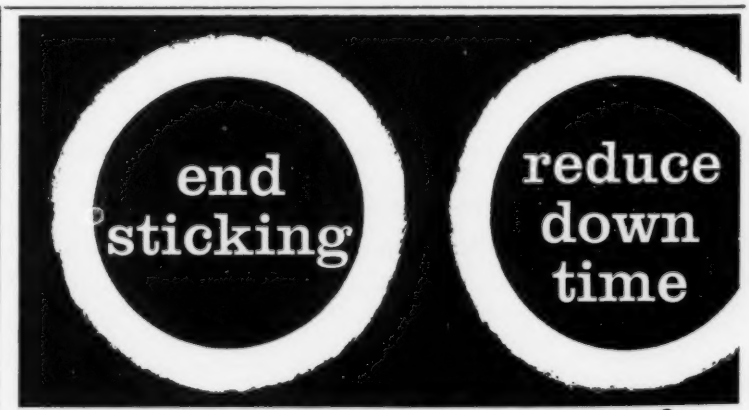
There are only two general types of calculations from the tables, too; so, lack of understanding on the part of the evaluator can hardly be a problem. Lack of understanding on the part of management is even less of a problem since the interest rate used is far more meaningful than the rates obtained from the old style rate-of-return analysis.

Another howl usually goes up against the necessity for making a year-to-year cash-flow forecast of the project. This can certainly be a difficult task and one that requires a lot of time, research, and estimating. The best argument is still the old one that any forecast is better than none, since none merely indicates the gross assumption that nothing will change. Even an opinion or an educated guess is better than this.

Use To Any Degree Of Accuracy

Furthermore, the present-worth method can be applied to any level of forecasting, *including* the simplest possible assumption that things will remain the same every year. Factors can be included or left out as desired. In other words, this is a broad, general method that can be applied with any degree of accuracy desired by the evaluator. The accuracy can be determined almost entirely by the amount of data used and the accuracy of the forecasting efforts. As such, it is inherently superior to the previous methods which added their own failings to the above inaccuracies.

Let's hold off working out our example by the present-worth



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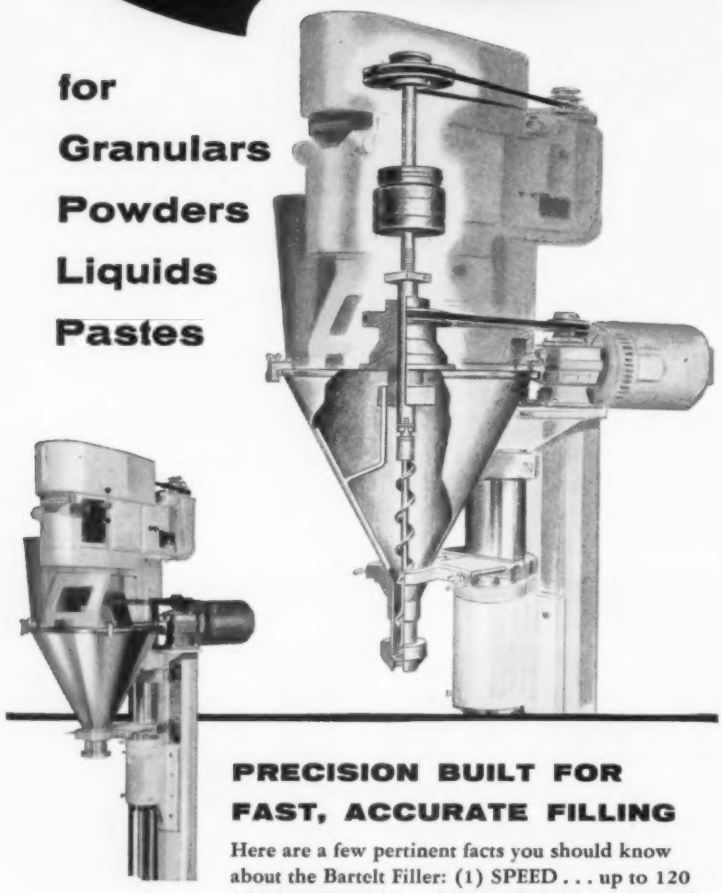

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method until we have examined the next system, since the actual calculations are virtually identical.

INVESTOR'S METHOD

There is one possible failing of the present-worth method. The present-worth ratio obtained as a final answer is not the same as the ratio of the actual interest rate earned by the project to the interest rate used in calculating the present worth of the annual earnings. For example, if an assumed interest rate of 20 per cent gives a ratio of two, this does not mean the actual interest rate of return on the project is 40 per cent. The investor's method eliminates this peculiarity of interest tables.

Present Worth In Reverse

Essentially, the investor's method is present worth calculated in reverse. The same year-to-year cash-flow forecast is made and totaled out to give project earnings for each year. However, now the assumption is made that the present worth of these earnings is *equal* to the total investment in the project plus working capital. In other words, a present-worth calculation would give a ratio of one. The problem is to find the interest rate that makes this take place.

Unfortunately, a trial-and-error solution is required. This should not be a major objection, though, since the actual interest-finding calculations need less than ten minutes.

Interest Rate Has Real Meaning

Interest rate determined by this method has real meaning. It is the *actual* interest rate at which the profits from a project *repay* the investment. It is also the *maximum* interest rate at which funds could be borrowed from a bank, or anywhere else, and have the project break even. Thus, when discussing these rates, management no longer needs to "wear two hats"—one for cost of capital, and the other for rate of return.

Otherwise, the investor's method has about the same advantages and disadvantages as the present-worth

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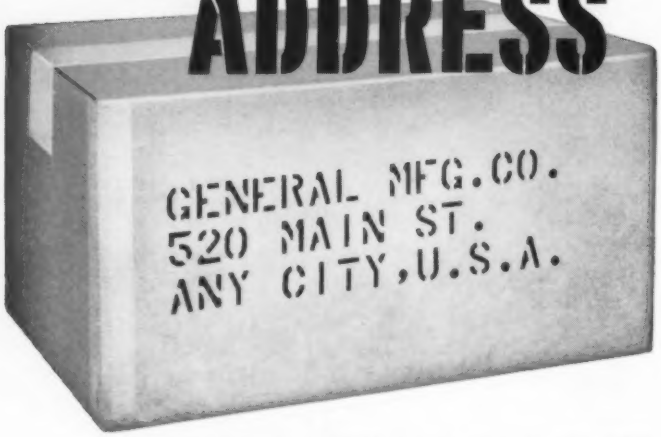

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method. A full year-by-year forecast can be utilized, the time value of money is adequately considered, and depreciation, taxes, and other variables all have their influence. Again, the cash-flow forecast can be as accurate and complete as the evaluator feels is justified.

A good many questions that have undoubtedly been asked during the preceding discussion of present worth and the investor's method are answered by working our packaging plant example.

Solving The Packaging Problem

To solve the problem by the investor's method, we must first determine what interest rate will result in the present worth of all cash-flow earnings plus other cash returns being equal to the initial total investment plus working capital. A trial-and-error solution must be made in which an arbitrary interest rate is picked. The procedure is then the same, using either the investor's method or present-worth method at that interest rate. We will start out using 25 per cent.

Make Up Evaluation Table

In Part A of the table, the accounting necessary to get a net-cash-earnings figure for each year is summarized. Normal cash-flow accounting procedures are used so that details should be unnecessary here. A table of this form should be made up for any economic evaluation solution, however.

The depreciation-cash-earnings column must be included since the allowance for depreciation, included as part of cost of goods sold, actually represents a cash contribution to the company's depreciation fund. As such, it must be included in a cash-flow tabulation, and represents one point where this differs from an ordinary profit and loss statement. Remember, however, due to the inclusion of depreciation as an expense *before* taxes in cost of goods sold, the net gain to the company is only 52 per cent of $5,000 or $2,600.

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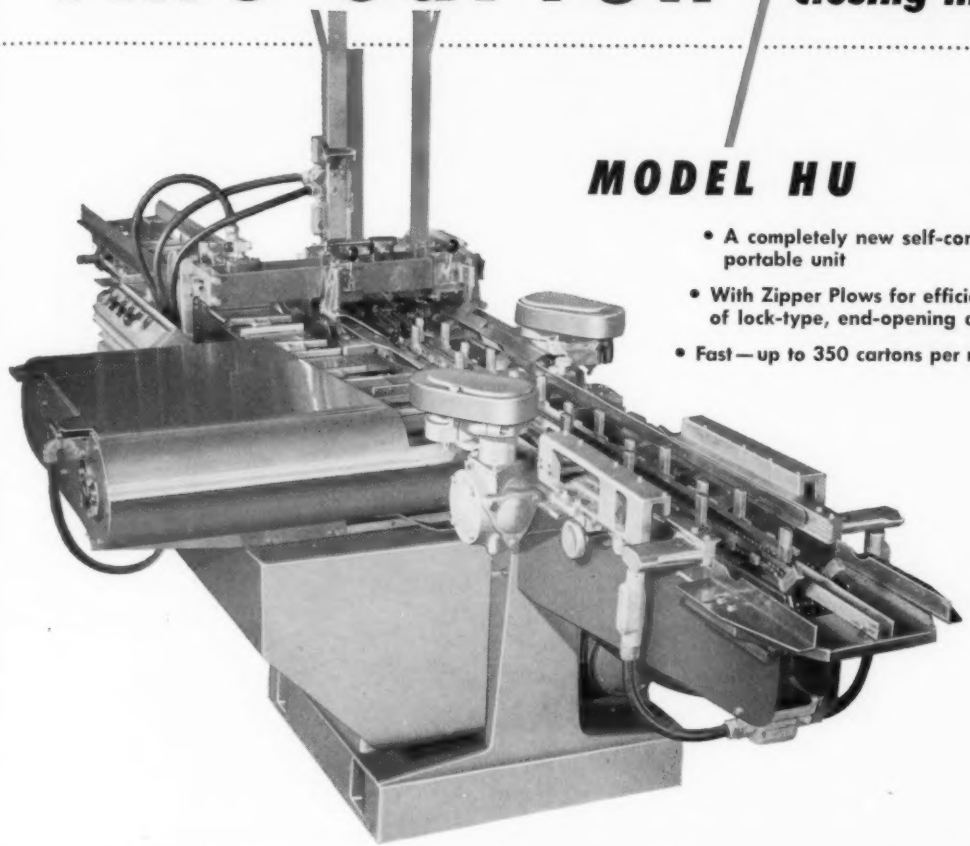

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coverable investments are sold and the working capital released. This is reflected in the $50,000 increase in net cash earnings in the tenth year.

Apply Present-Worth Factor

We now have a net cash earnings figure for each year, and the only remaining problem is to apply a present-worth factor for each year as shown in Part B of the table. These present-worth factors can be found in almost any good textbook on engineering or managerial economics, and in many handbooks. Merely multiplying the net cash earnings by the present-worth factor gives the present worth of the earnings for that year at the chosen 25-per cent interest rate.

The first trial using 25 per cent gives a total present worth of $98,-600, slightly below the desired $100,000.

At this point, the present-worth method is essentially complete. Working our present-worth ratio,

$$\text{Present-worth ratio} = \frac{\text{Present worth of total net project earnings}}{\text{Total investment} + \text{Working capital}}$$

$$= \frac{\$98,600}{\$80,000 + \$20,000} = 0.986.$$

This gives us a ratio *slightly under* one, which means our project will *not* return quite the necessary 25 per cent. While this present-worth method gives us a "go, no-go" answer, it does not tell us what actual interest rate will be earned. To find this, we must return to our solution by the investor's method.

We make another trial using a slightly lower rate, 24 per cent. The calculations in the table now show a present-worth value of the earnings of $101,600; so, we bracket the desired total investment figure of $100,000. We can conclude, therefore, that the correct rate is somewhere in between probably about 24½ per cent.

Note Flexibility

Remember, this is the *actual* interest rate at which the earnings will repay the investment.

Even with this very simple example designed for a rapid solution, note for a moment that actually more facts are put to use here than can be utilized with either the payout-period or rate of return-on-investment methods. A change in the level of sales, and a change in costs, are considered. Depreciable investment, recoverable investment, and working capital are put in their correct relationship. Finally, a full accounting is made for the time value of money. Yet, again, this is a very simple problem that can be easily expanded to absorb a great deal more data if desired.

Another point: While this example specifies a new plant construction job, the purchase of a new packaging machine or any other project can be chosen. Savings can be substituted for sales, and expenses for cost of goods sold. All calculations, including those for taxes and depreciation, if the company is making a profit, will remain the same.

The method can even be used in those cases where a machine must be purchased, but actually operated at a loss. Here, the results indicate the "least undesirable" alternative. Neither payout period nor rate of return on investment makes much sense in a loss situation.

Systematizes Economic Factors

Recognition of the interrelationship of the many economic factors in a business system is becoming increasingly widespread. Any one of the variables involved in a situation can be the one that should control the final choice. This is as true in packaging as in any other field.

Here is a method that systematizes these factors in such a way that their true relationships are exposed in the simplest possible fashion. The well-rounded engineer should include such a tool among his facilities at hand. *(End)*

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Part III—Wrapping machines—using top and bottom closures for cube-shaped objects, and twist features for irregular-shaped objects; tube forming in form-fill-and-seal bag packaging machines

Packaging machines cause mechanical stresses in flexible materials

By H.-E. Roder,*
Farbwerke Hoechst A.G., Frankfurt, Germany

Rudolf Heiss and G. Schricker,
Institute for Food Technology & Packaging, Munich, Germany

Concluding their three-part article on the results of their investigations of mechanical stresses in flexible packaging materials, the authors differentiate between two types of stresses in wrapping machines —those using top and bottom closures for cube-shaped objects, and those using twist wrapping features. In the case of the latter, they discuss the occurrence of biaxial stresses, emphasizing the need for low stiffness and high elongation in a material to obtain optimum performance. On the subject of form-fill-and-seal bag machines, they explain tube-forming and tell how to achieve uniform stress distribution.

We have discussed tube-forming and creasing processes in bag machines, and some of the stresses caused in packaging materials. Also, we have covered automatic packaging machines, explaining what happens when a bag is being formed. In this concluding part, we will look at stresses caused by wrapping machines and form-fill-and-seal bag packaging machines.

3. WRAPPING MACHINES

With regard to the forms of mechanical stress occurring in wrapping machines, we must differentiate between two types:

A. Wrapping machines for cube-shaped objects, with top and bottom closure or similar form of closure;

B. Wrapping machines with twist-wrapping features for objects of indefinable shapes.

3A. FOR CUBE-SHAPED OBJECTS

To the first type belong those wrapping machines for cigarette packs, chocolate bars, margarine and butter prints, etc. The wrapping operations are the same in principle as in automatic packaging machines in which a section of packaging material is formed around a block-shaped mandrel.

For the most part, difficulties are likely to arise in the transport of the packaging material and in forming of the material section, due to a tendency for it to roll and to insufficient stiffness. Pinholes can occur at the corners of the articles being wrapped. Difficulties encountered are not fundamentally different from those encountered in automatic packaging machines or bag machines. (See section on "Pinhole Formation In Bending."†)

3B. TWIST WRAPPING

To the second type belong machines for wrapping individual pieces of candy, single cigars, etc. We will discuss the forms of stressing imposed by these machines, using as an example a high-speed wrapping machine for hard candies. (See Fig. 14.)

The candy pieces are transported by a vibrator to a turntable (see Stage 1 in Fig. 14). Then, the piece, a, is conveyed in a recess to a particular position where the section

*Dr. Roder worked on this article while at the Institute.
†In Part II, in last month's issue.

of wrapper, b, is laid over it. (The material feeds from a roll and is cut into sections by means of a transversely positioned knife.)

A square rod, c, pushes the candy and the wrapper upward, when a platen-shaped holding device, d, is picked up by the paper to prevent the piece from falling off the rod (Stages 1 and 2 of Fig. 14). During the upward movement, the overlapping ends of the wrapper are folded over the side surfaces of the piece and protrude downward. This latter operation is effected by two parallel plates, s, between which the candy is guided. A bar, c, reciprocates up and down (Stages 1 to 3). At the uppermost point of this motion, the retainer, d, lifts off.

Be Careful Of Wrapper Flutter

Pushing the candy from the turntable creates air turbulence which can cause wrapper sections of low flexural stiffness to flutter. Due to this, the wrapping section, b, can become creased and, therefore, useless as it runs along the guide plates, s. Thus, it appears advisable to use packaging materials of relatively high flexural stiffness for these purposes. However, this is not a favorable solution, since, for the subsequent twisting operation, the lowest possible flexural stiffness is required. Fluttering must, therefore, be eliminated by modification to the machine—for example, by an extended guide system for the wrapper, b.

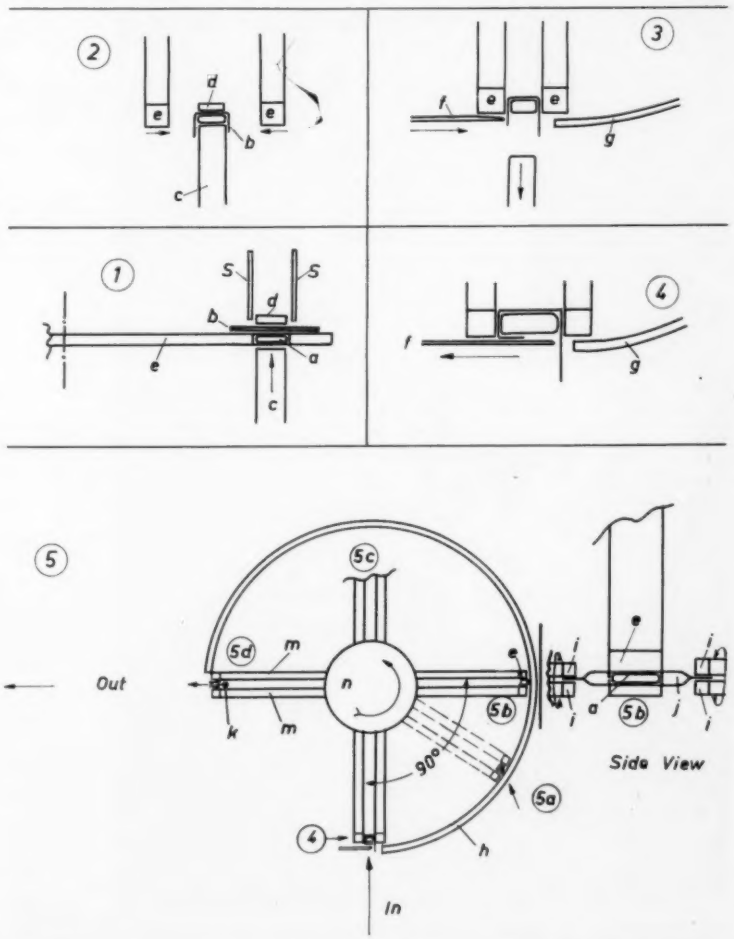
After the retaining device, d, has lifted, the partially wrapped piece is grasped by two claws, e, and a knife, f, folds over the left overhang of the wrapper (Stages 3 and 4). Then, the right wrapper overhang is folded over (Stage 5a). This is done by the claws, e, which are attached to the turntable by steel flats, m, and turn through 90°. While turning, the claws slide along a cylindrical steel sheet, thus folding over the right overhang of the wrapper.

In Stage 5b, two pairs of pincher claws, i, press the wrapper ends, j, flat and twist them in opposite directions through 360°. After the claws, i, withdraw, the claws, e, move with the candy to Stage 5c and the wrapped piece is ejected from the machine at Stage 5d.

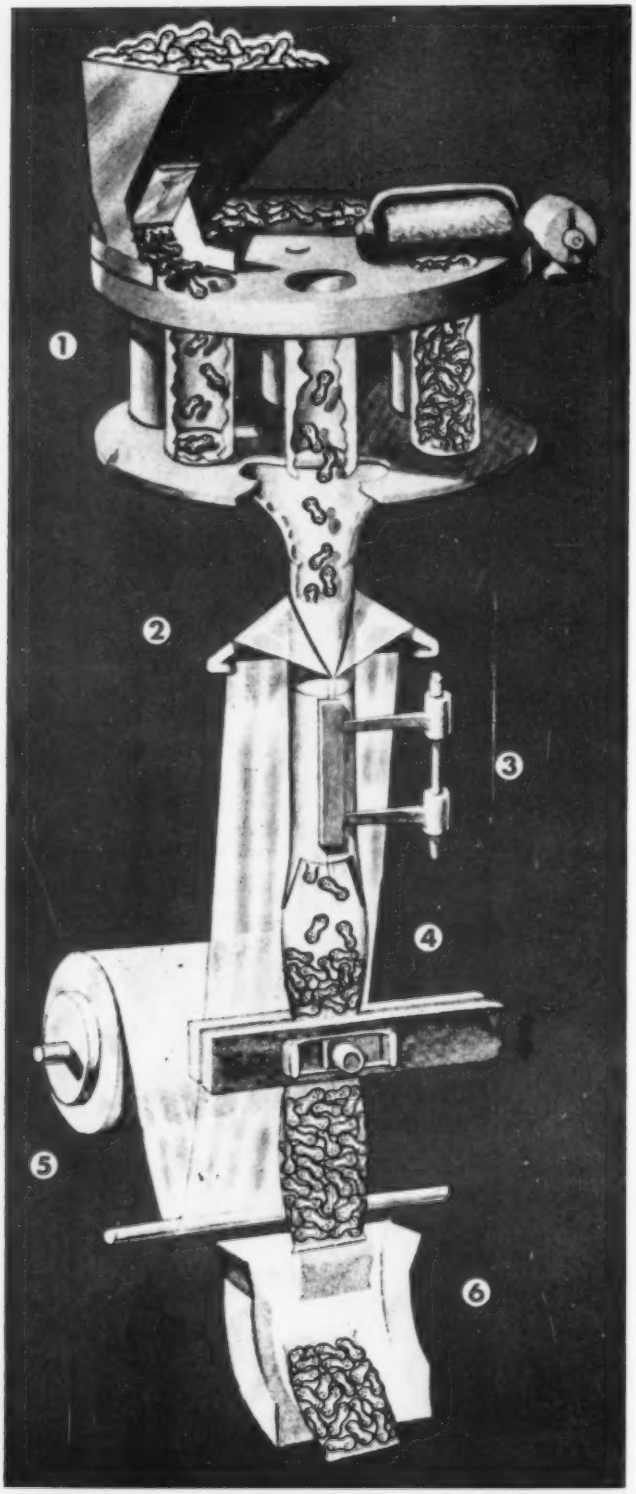
Biaxial Stresses In Twisting

The highest stresses, to which the packaging material is subjected, occur in the twisting of the wings. The material must not spring back into its original position after twisting. Therefore, an important characteristic is *high plasticity* combined with *low elasticity*. As in creasing, deformation, due to extension and compression, occurs in twisting. In contrast to creasing, however, it is a stress in the two directions of the material. Thus, to assess the suitability of a packaging material for twisting, it is possible to crease it in two mutually perpendicular directions and measure the spring-back angle.

If this is less than 20 to 30°, under the operating conditions (moisture, rate of creasing, spring-back time), the material is very probably suitable. For these purposes, the spring-back time should be fixed at 5 min. After this time, for most materials, there is no further change in the spring-back angle, which could significantly affect the result. The necessary rate of creasing, for which the above-mentioned crease testing apparatus must be adjusted, can easily be estimated. *(Turn page)*



14 **TWIST-WRAPPING** causes highest stresses in packaging material—biaxial stresses. Important requirement of material is *high plasticity* combined with *low elasticity*. Measurement of spring-back angle determines material's suitability. (See text for above operations.)



15 **FORM-FILL-AND-SEAL BAG MACHINES** cause packaging material stresses only during tube forming—more complicated than in bag machine, as flat web is fed from side of tube former *opposite* that of longitudinal seal. Part No. 1 is filler; No. 2, shoulder; No. 3, longitudinal sealer; No. 4, transverse sealer; No. 5, feed roll; No. 6, point where cut-off bag is dropped to conveyor.

At a machine output of 400 pieces/min., a rotation of the turntable through 90° takes place in 60/400, or 0.15, sec. During this time, the turntable must be accelerated and braked. While it is stationary, the claws, i, grasp the wing ends of the wrapper, twist them, and withdraw.

Therefore, we can conclude that the twisting takes place in 0.05 to 0.07 sec. Approximately the same rate of loading can be achieved in the creasing apparatus if the feed velocity is adjusted to about 30 cm./sec. (~1 ft./sec.). Then, a single crease is made in approximately the same time as above—0.05 to 0.07 sec.

Need Low Stiffness, High Elongation

If the packaging material is stiff and relatively inhomogeneous, as is the case with paper, pinholes form at the points where crumpling occurs. These can lead to tearing. Therefore, it is advisable to select a packaging material with a stiffness as low as possible and an elongation-to-rupture as high as possible.

It is generally accepted that the *tendency to tearing decreases with increasing elongation-to-rupture*. It has been shown that cellophane can be very satisfactorily processed on wrapping machines. This is due to the fact that cellophane possesses a high elongation-to-rupture and, consequently, shows a relatively slight tendency to tear.

Summarizing, **a packaging material for use on candy twist-wrapping machines must possess the largest possible elongation-to-rupture, a relatively high resistance to initial tearing, and the least possible stiffness and resilience.**

4. FORM-FILL-AND-SEAL BAG MACHINES

On form-fill-and-seal bag packaging machines, flat bags are fabricated, filled, and closed by means of heat sealing. The mode of operation is as follows (see Fig. 15):

The packaging material feeds from a roll, 5, and is shaped into

a tube around a filling tube. Heat sealing of the longitudinal seam is effected by pressure of a heated plate, 3, on the packaging material, with the filling tube as counterbearing. A transverse heat seal is then made on the finished tube below the filling tube. With this latter seal, the material tube is closed off and can be filled by a dispensing unit. In the next operation, movement of the tube through one bag length, heat sealing of the next transverse seal, and separation of the bag take place.

4A. TUBE-FORMING PROCESS

The packaging material is stressed mechanically only in the tube forming. This operation is more complicated than in bag machines, since the flat packaging material web is fed in from the side *opposite* that of the longitudinal seal. Arrangement of the filling tube makes tube forming as in bag machines impossible.

As shown in Fig. 15, the bag tube is formed by the flat web sliding over an arched shoulder, 2, in which the filling tube stands as a neck. In order to avoid stress concentrations in the packaging material, it would be desirable, as in tube forming on bag machines, to attain a uniform stress distribution throughout the whole web. This is the case when equal elongation or change in length occurs along imaginary lines in the web parallel to the margin and at infinitely small distances apart. This uniformly stressed condition is achieved when all parallel lines travel equal distances in the tube-forming process with the web taut.

Uniform Stress Distribution Possible

In Fig. 16, as the web is being pulled over the shoulder, note that the margins, a, of the web bend inward to form the overlap seam. Thus, the margins usually travel a greater distance than the center line, b, of the web, and are therefore subject to greater elongation.

It is possible to shape a shoulder in such a way that all of the paths

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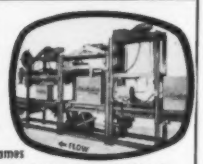

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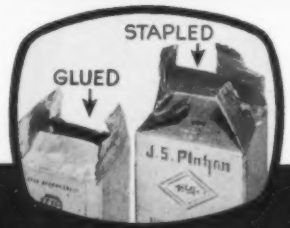

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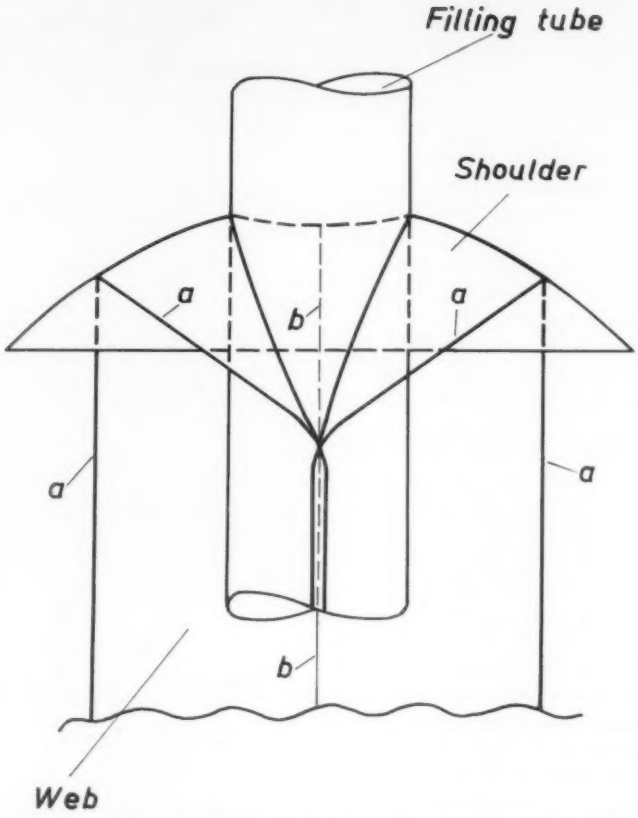

16 UNIFORM STRESS DISTRIBUTION throughout material web is possible when shoulder of form-fill-and-seal bag machine is shaped in such a manner that all paths traveled by lines parallel to margins, a, or to longitudinal center, b, of web are the same length.

traveled by the lines parallel to the margins or center of the web are of equal length. Calculation of a shoulder fulfilling this geometrical condition would be extremely difficult. However, it is possible to shape a shoulder out of a pliable material, and then, by means of measurements on the packaging material sliding over the shoulder *(2)*, to determine whether or not stress distribution is uniform so as to derive a correct practical shape.

If we do not take advantage of this design possibility, the packaging material must withstand the stresses imposed. Apart from the conditions of friction, we have here the same conditions that we have enumerated for the tube-forming process—highest possible elastic extension, large elongation-to-rupture, and low flexural stiffness. If the elongation-to-rupture is very large, the condition regarding flexural stiffness can be disregarded for reasons given previously.

Reduce Shoulder Friction

As in tube forming on bag machines (see Section 1A),‡ friction of the packaging material on the shoulder which serves in this instance as the tube former, increases the tension in the web. Therefore, the surface of the shoulder must be finished as smoothly as possible or coated with a layer of material having a low coefficient of friction.

The edge of the shoulder, where it joins the filling tube, is frequently made very sharp. From the machine designer's point of view, this helps in guiding the packaging material into the new direction. As a result, however, packaging materials of low elongation-to-rupture tear, since the operation involves

‡ In Part I of this article which appears in our July, 1960 issue.

bending over a very small radius of curvature with the simultaneous effects of frictional/tensile stresses.

CONCLUSIONS

This work closely investigates a few particularly important operations on packaging machines, which involve mechanical stressing in flexible packaging materials, and discusses their quantitative evaluation and the possibilities for improving them.

Processing operations in the following types of packaging machines for flexible packaging materials are investigated:

1. Bag machines which work from the roll;
2. An automatic packaging machine, on which the bag material section is folded around a mandrel;
3. A wrapping machine for hard candies;
4. A form-fill-and-seal bag packaging machine.

For these machines, the following forms of mechanical stress in the packaging material are discussed:

A. Tube forming on bag, and form-fill-and-seal bag packaging machines;
B. Creasing on bag machines and on automatic packaging machines;
C. Twisting on a candy wrapping machine.

The demands placed on the mechanical properties of the packaging material, and on the design and setting up of the machine resulting from these types of stresses are discussed. Possibilities are discussed, and suggestions made, for modifications to the packaging material or the machine to avoid difficulties in processing. Attention is drawn to the solution of processing problems by reproducing the operations on test apparatus.

Tube Forming

In tube forming on bag machines, mechanical stresses resulting from non-uniform tension or elongation of the web, and from the inward bending of the flat section into the formed tube section of the web, can be largely eliminated by suitable design measures. In this respect, the requirement for the lowest possible stiffness must be fulfilled by the packaging material. For tube forming on form-fill-and-seal bag packaging machines, a relatively high elastic extension or elongation-to-rupture is also desirable.

Creasing

Low resilience—small elastic and large plastic deformation—in the packaging material is recommended for all creasing operations. To avoid weakening of the material in the crease, a large radius of curvature in the crease is maintained: (1) by providing the machine elements, forming the crease, with a corresponding radius of curvature (for example in the case of creasing knives), or (2) by appropriate setting (in the case of creasing rolls).

Pinhole Formation

Low flexural stiffness and large elongation-to-rupture insure a minimum of pinhole formation in the

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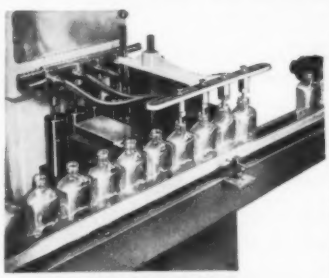

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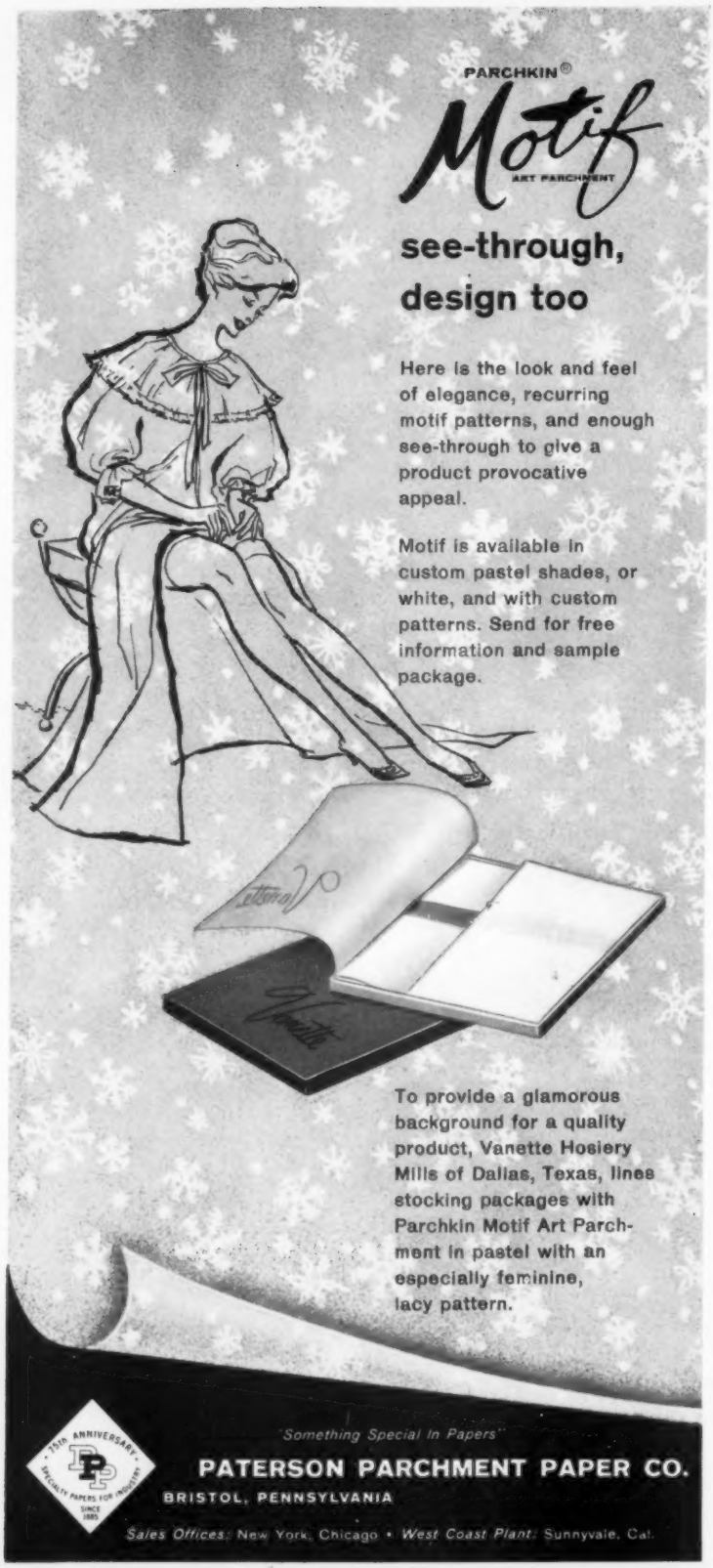
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packaging material, for example, at the corners and edges in folding the bag bottoms. If the damage, in regard to barrier properties incurred by creasing the packaging material, is excessive, we recommend coating the material with a layer of plastic material of high enough extensibility. Coating must be done in such a way that the stress applied per unit strain (stiffness) of the film is small compared with that of the base material. This avoids an increase in the resilience of the material due to the coating.

Twisting

Stresses involved in twisting on wrapping machines call for approximately the same material properties as those required for creasing, namely, large plastic and small elastic extension combined with large elongation-to-rupture and minimum flexural stiffness.

Quantitative evaluation of the upper and lower limits of flexural stiffness is important for the improvement of material processing on packaging machines. Permissible range varies from machine to machine and must be determined by means of measurements of the flexural stiffness carried out in conjunction with test running. The lower limit for the resilience of the packaging material after creasing has been reported in a previous work *(3)*.

We make no claim that the work points out all of the difficulties encountered in running flexible materials on these machines. Such work will involve further investigation into phenomena such as tendency to roll, and frictional and electrostatic charging effects.

Literature Cited

(1) Corte, H., "Mechanical properties of paper bags," *Verpackungs-Rundschau*, **6** (1955), pp. 49-55, (in German).

(2) Roder, H.-E., "The stresses imposed on packaging materials during the tube forming on bag machines," *Verpackungs-Rundschau*, **9** (1958) No. 9, pp. 69-75, (in German).

(3) Schricker, G., Roder, H.-E., and Heiss, R., "On the behavior of packaging materials in creasing, in the manufacture of soft packings," *Chemie-Ingenieur-Technik*, **31** (1959) No. 10, pp. 633-642, (in German). *(End)*

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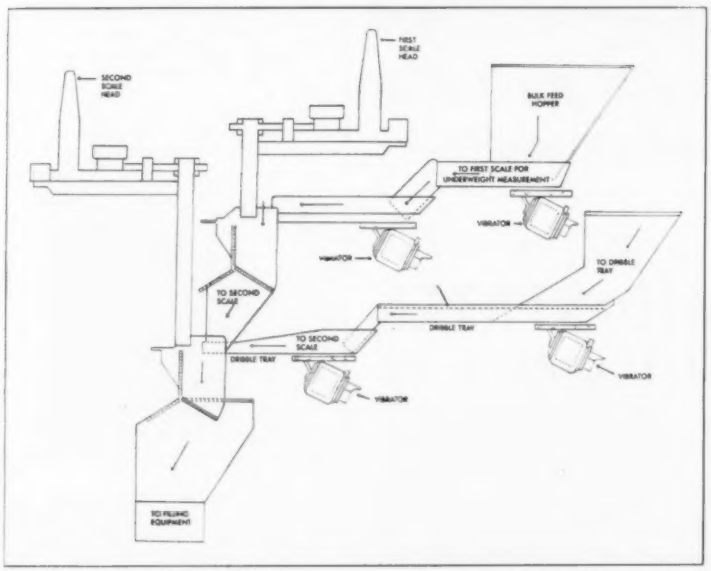
1—Automatic Net Weigher

A new method for automatic net weighing is a key feature of Hayssen's double bucket net weight scale. Its developers claim a degree of accuracy not previously possible with weighing equipment using a single dump and weighing system. Package weights are accurate to plus one piece (of product) because each load is weighed twice. In operation, the first bucket scale receives and weighs a dump of the product fed continuously from the bulk hopper by two vibrators. An automatic actuating device then dumps an underweight measure of the bulk charge into the second bucket scale. At the same time this process is taking place, a dribble charge of the product is being passed along by vibrators on a separate dribble tray which feeds directly into the second bucket scale and brings the initial bulk charge up to accurate weight. The bulk and dribble charges of product are thus being delivered to the second scale for full-weight measurement simultaneously. When full weight is reached, this second scale automatically dumps the product into bucket conveyors for transfer to the filling equipment. In contrast to single-scale equipment where the bulk filling operation takes about 92 per cent of the time allotted to the filling cycle and leaves only 8 per cent of the cycle time for the dribbling operation, Hayssen asserts, this system gives both scales a complete time cycle in which to be loaded and weigh the product. Another feature of the unit is that the dribble-feed tray has been lengthened to 3 ft. with the product passing over two vibrators. This permits uniform dribble feed, product separation, and 1-piece feeding to the second bucket scale, according to the maker, with accuracy of plus one piece being possible. Applications include automatic packaging of items such as candy, nuts, screws, tablets, etc., with typical operating speeds of 60 to 70 packages/min. For further information write: Hayssen Mfg. Co., Dept. PE, Sheboygan, Wis., or *circle number on card.*



2—Coupon Inserter

A coupon placing machine which actually places the insert inside the container, rather than dropping it into position, has been developed. During the placing stroke, a vacuum cup is moved straight down into the container where the insert is released. Unit handles coupons, booklets, premiums, and other light, flat objects. Available in single- and multiple-head models, the machine is fully automatic, portable, and fits most lines. For more information write: Thiele Packaging Machinery Co., Dept. PE, 1000 Berry Ave., St. Paul 14, Minn., or *circle number on card.*

3—Antioxidant Cellophane

A new film, called Olin OF-20, is coated with a combination of antioxidants that retard oxidative rancidity. Coating is applied to both sides of the cellophane base sheet and FDA approved for use with foods. It is said to increase shelf life up to 50 per cent over that afforded by standard cellophanes by offering extra protection for flavor, aroma, and freshness of such food items as potato chips, crackers, etc. Available in 300-gauge thickness, it is designed primarily as an inner-wall bag. For more information write: Olin Mathieson Chemical Corp., Dept. PE, 460 Park Ave., New York 22, N.Y., or *circle number on card.*

4—Metal Seam Welder

Featuring self-tuning, a new ultrasonic seam welder for aluminum foil and other thin metals has been announced. Welder is available with traversing heads for rolling mills where the seam crosses a stationary web or stationary heads for package sealing operations utilizing a continuously moving web. Welding frequency is automatically adjusted despite fluctuations in material thickness or cleanliness, according to the maker. Materials as thin as 0.00017 in. and as thick as 0.006 in. can be joined. Dissimilar metals and metals of different thickness can

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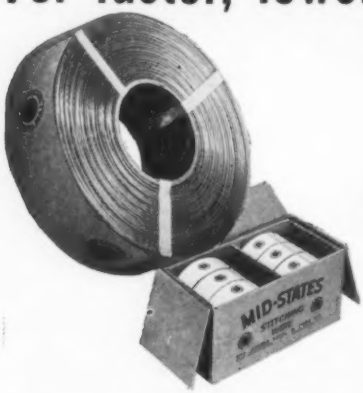

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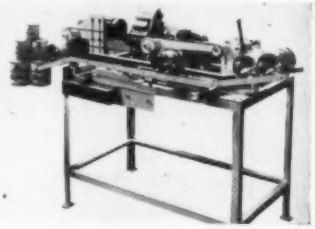
5—Can Imprinter

The Rejafix Model E1/T is a fully automatic can imprinting machine. The unit will print codes, color



shades, etc. onto lithographed metal cans, allowing for proper registration of print. Markings in diameters up to 4½ in. can be printed, and it operates at speeds up to 1,500 cans/hr. For more information write: Popper & Sons, Inc., Dept. PE, 300 Park Ave. South, New York 10, N.Y., or *circle number on card.*

6—Plastics Welder

A new line of variable-frequency power packs is being produced for fusion of plastics. The 500-watt

Model 31A Intratherm power source incorporates a pulse integrator which, in combination with the variable frequency feature, permits faster cycling without electrode flashover or imperfect welds, the manufacturer says. Other claims for the device are simplified controls, fewer parts, reduced size, direct coupling, and elimination of radiation problems. For more information write: Gregory Blessing Assoc., Dept. PE, Solana Beach, Calif., or *circle number on card.*

7—Polyethylene Coating

A new formulation of polyethylene, especially designed to produce thin extrusion coatings on paper and other substrates, is now available in

natural and colors. At weights as low as 7½ lb./ream, Tenite 895 produces coating free of pinholes, and its drawdown properties permit coating as thin as 3 lb./ream, says the producer. Minimum sealing temperature is about 270°F. and the material has a melt index of 3.5 decigrams/min. and a nominal density of 0.921 gm./ml. For more information write: Eastman Chemical Products, Inc., Dept. PE, 260 Madison Ave., New York 16, N.Y., or *circle number on card.*

8—Inspection System

A new light-sensing electronic inspection system for detecting and removing a variety of imperfect

items from a production conveyor line has been developed. For use on conveyor belts up to 10 ft. wide and at speeds up to 600 ft./min., any material flaw that causes a 3 per cent or greater change in light reflected or transmitted through the material is detected, according to the manufacturer. An actuating device for removing or marking the flaw is specially designed for each application. The scanner, positioned above the conveyor belt, optically scans across the belt 14,000 times/min. Applications include detecting flaws in sheet plastic and removing discolored food products from the processing lines. For more information write: Atronic Products Inc., Dept. PE, One Bala Ave., Bala-Cynwyd, Pa., or *circle number on card.*

9—Polyethylene Film

A new type of polyethylene packaging film combines the transparency of high-clarity types with the strength of more durable varieties, says the producer. Specifically designed for bag making, toughness of the film was demonstrated by withstanding 25 per cent more drops (in a drop test) than existing high-impact films and 150 per cent more drops than high-clarity films. Film resists blocking from up to 130°F. down to 60°F. below zero. Film is available in 100-, 125-, 150-, and 200-gauge thicknesses and is furnished in medium- and high-slip forms. For more information write: E. I. du Pont de Nemours & Co.

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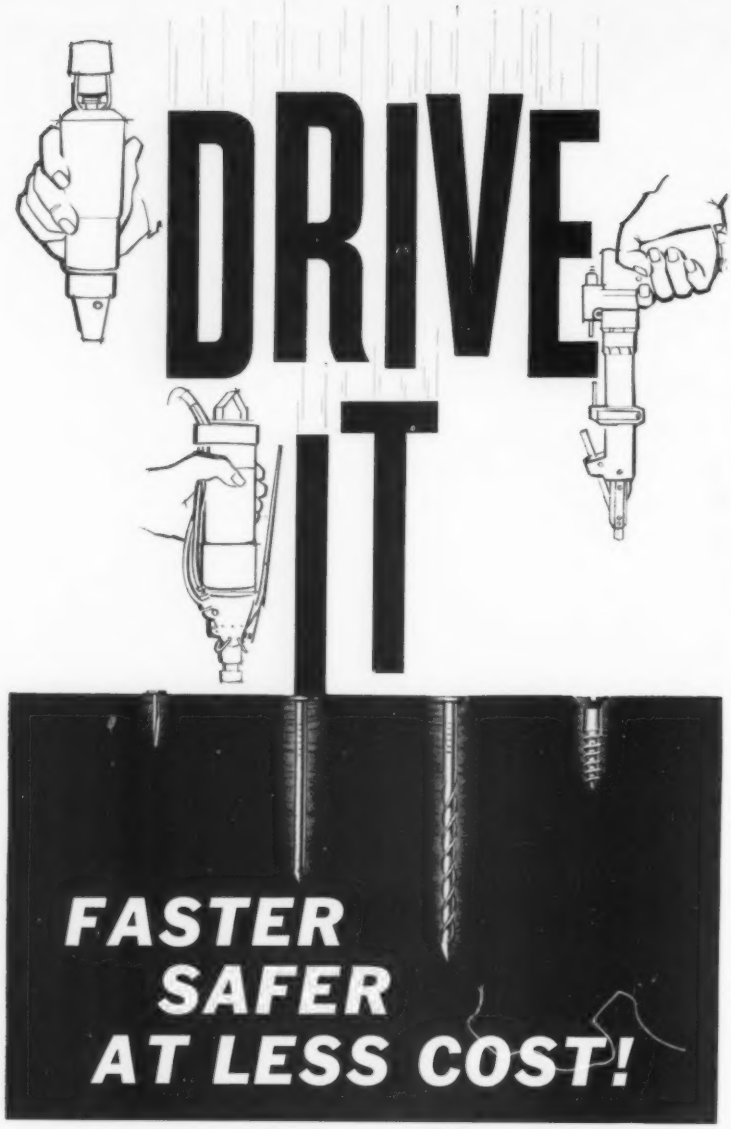

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10—Metal Detector

The Proxitron is a new proximity switch that detects any type of metal without physical contact. Control unit is transistorized, is supplied with standard ½-in. male probe and 5-ft. shielded cable, and the probe head can be immersed in liquids. Standard relay 2 amp. capacity up to 1,000 operations/min. For high-speed applications, ballast replaces plug-in type relay providing electrical signals up to 100,000 operations/min. Counting, batching, broken tool detection, multiple-operation machine coordination, and conveyor and feeder control are suggested applications. For more information write: Automation Devices, Inc., Dept. PE, Erie, Pa., or *circle number on card.*

11—Blister Former

Reporting development of a new vacuum blister former, Model 300A is designed for both short- and long-run users of blister packaging. Enabling user to manufacture its own

blisters, it may be sheet- or roll-fed and handles polyethylene, styrene, acetate, butyrate, and extruded acrylics. Standard plate size is 15x20 in., but larger plate sizes are also available. For more information write: Plast-O-Craft Corp., Dept. PE, 503 McCarter Hwy., Newark, N.J., or *circle number on card.*

12—Saturating Papers

The addition of seven new saturating papers of various weights has been made to the custom-made paper line of Paterson. All of the new papers are designed for use as a base sheet for saturating with latex and subsequently processing as pressure-sensitive tapes. The basis weight for 500 sheets, 24x36 in., ranges from 29 to 55 lb. Colors offered are white and brown, and sizes, in sheets and rolls, are up to 72 in. and 84 in. wide. Papers may also be processed for use as carton sealing, masking, and

printing tapes; and protective tapes and sheeting for polished metal, wood, and plastic products. For more information write: Paterson Parchment Paper Co., Dept. PE, Bristol, Pa., or *circle number on card.*

13—Textured Coating For Cans

Decorated cans with textured finishes have recently been introduced for lithographed or coated metal

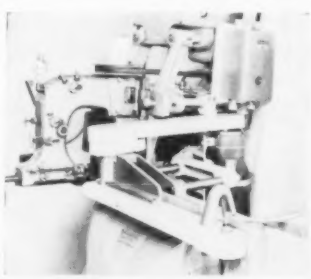
cans. In addition to the decorative aspects of the finishes, the textured surfaces make the containers easier to grasp and hold, the manufacturer states. Coatings may be clear material over printing or can serve as a base coat under the printing. A variety of textured effects can be produced by the coating. For more information write: American Can Co., Dept. PE, 100 Park Ave., New York 17, N.Y., or *circle number on card.*

14—Automatic Weighing Scale

A new scale for use in conjunction with automatic conveyor line packaging is the Merco-Weigher, which the manufacturer says is capable of automatic measures within 1/64 of an ounce. Weighing capacity is 5 lb. and triple weighing units operate simultaneously. The weigher can also be used in conjunction with the Verti-Pak which forms a bag, then weighs, fills, and seals up to 45 packages/min. For more information write: Mercury Heat Sealing Equipment Co., Dept. PE, 2601 N. Howard St., Philadelphia 33, Pa., or *circle number on card.*

15—Bag Sewing Attachment

The development of a new sewing attachment to simplify and speed closure of multiwall paper shipping



bags has been announced. The Sew-Rite attachment, which is mounted on the sewing pedestal, permits the bag to adjust itself properly before engaging in the sewing machine. An operator guides the filled bag into

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  No space is ever wasted by a metal tube; it folds right up to fit the product skin-tight. Users appreciate fold-up tubes that tuck into small space—in an attache case, or even a purse.

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  No matter how you beat up a tube, it still functions as intended. Drop it, throw it, step on it, it's still a tube and acts like one.

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  Almost anyone can exert the gentle squeeze that makes a tube work—even children, and hands crippled by arthritis. You don't have to put your foot on a tube to operate it.

- **FEEDS ACCURATELY**

  A tube is an easily-controlled dispenser. It doesn't spurt or squirt; just emerges smoothly and calmly.

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the unit's co-acting V-belts, and from that point, the bag is automatically fed into the sewing machine. For more information write: Bemis Bro. Bag Co., Dept. PE, 408 Pine St., St. Louis 2, Mo., or *circle number on card.*

16—Aerosol Container

A new 13½-cc. stainless steel inner container for aerosols is being manufactured. The new larger unit is

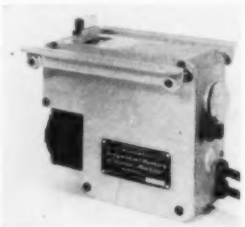
being introduced as a complete package with metered valve assembly. The container may be used wherever a metered dosage of the contents from a small-sized unit is practical such as purse-size dispensers of perfumes, insecticide concentrates, and pharmaceutical products. For more information write: Emson Research, Inc., Dept. PE, 118 Burr Court, Bridgeport, Conn., or *circle number on card.*

17—Coffee Bagger

An automatic machine has been introduced for filling of pre-ground coffee. Type KFAS serves as a complete, straight-line packaging operation. Double-walled bags are formed, filled, closed, and delivered at speeds up to 70 bags/min. Both the inner liner of Pliofilm, glassine, or cellophane, and the outer bag are automatically cut and formed from roll stock. Bag size changes can be made from 8 to 16 oz. For more information write: FMC Packaging Machinery Div., Dept. PE, 4900 Summerdale Ave., Philadelphia 24, Pa., or *circle number on card.*

18—Code Marker

New improvements have been announced for the Schubert 110 code marker. The unit incorporates an



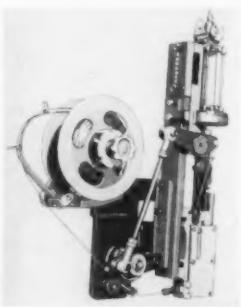
electrically-activated clutch which assures a single cycle while maintaining accurate timing, the manufacturer says. The new clutch has additional applications in equipment requiring single-revolution positive timing. Higher speed and simplified installation on packaging lines are said to be possible. The unit will either make an impression mark or may be adjusted for roll-over marking on roll-through labeling machines. For more information write: H. A. Schubert Co., Dept. PE, 1212 Washington Ave., Wilmette, Ill., or *circle number on card.*

19—Polyethylene Film Resin

Development of a new polyethylene film grade resin that produces a cast film of exceptional clarity and high gloss and stiffness is claimed by the producer. Film made from the new resin, designated Petrothene 218, is suited for overwrapping a variety of products. Density of the resin is 0.933 gm./cc. and it has a melt index of 3.0. Film gauges as thin as 0.0005 in. can be produced at extrusion stock temperatures of 450° to 550°F. and casting roll temperatures of 80° to 170°F. The resin is also available in medium-low and medium-slip formulations. For more information write: U.S. Industrial Chemicals Co., Dept. PE, 99 Park Ave., New York 16, N.Y., or *circle number on card.*

20—Stapling Head

For heavy-duty service, a new self-contained, air-driven stapling head is being produced. Suitable for in-



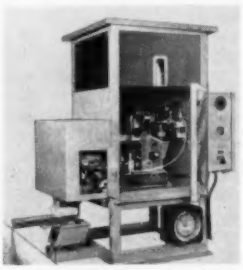
dependent mounting, the unit features a head which does not require specially prepared wire stock or preformed staples. Instead, it cuts, forms, and drives its own staples direct from coils of standard wire. Heads may be mounted vertically or horizontally and fitted to produce staples from ¼ to 1 in. width or from ⅜ to 1½ in. staple leg length. Staples will penetrate materials to a total thickness of 1⅜ in. allowing for clinch. Unit may be used for stapling woods, plastics, fibreboards, paperboards, etc. For more information write: Saranac Machine Co., Dept. PE, Benton Harbor, Mich., or *circle number on card.*

21—Can Case Packer

A new high-speed, automatic can packer has been designed for packing cans into top-loading cases. Speeds up to 1200 cans/min. can be obtained, the manufacturer claims. Positive automatic feed requires no operator. The packer may be equipped with an automatic feed for positioning reshipper cases or a magazine feed to open and feed knockdown flap cases to the packer. For more information write: A-B-C Packaging Machine Corp., Dept. PE, Tarpon Springs, Fla., or *circle number on card.*

22—Continuous Weighing System

A new type machine for high precision, continuous weighing of loose, free-flowing granular solids has been



developed. The machine introduces a new system for inserting dry additives into processing lines operating by conveyor, pipeline, or other continuous-flow methods. Fully automatic, the unit is designed to dump accurately net weighed quantities at uniform time intervals. The system has applications in processing streams of chemicals, plastics, foods, drugs, and similar products where high-concentrate additives must be inserted in exacting quantities. It will handle products in quantities from 1 oz. to 3 lb. and 3 lb. to 10 lb. Multiple units of two or more machines may be combined to increase the number of weighments per minute. For more information write: The Exact Weight Scale Co., Dept. PE, 538 E. Town St., Columbus 15, Ohio, or *circle number on card.*

23—Tablet Hardness Tester

A new hand-held tablet hardness tester is now available. According

to the maker, tests indicate that the precision device is 4 times faster than existing instruments. Based on

SAMCO JR.

Designed to fill shorter runs

IDEAL FOR FOAMY AND DIFFICULT PRODUCTS

Gravity feed . . . readily handles plastic containers

Uncomplicated, simple in operation and therefore efficient and trouble free. Main supply contained in overhead tanks. Flow of product feeds through stainless steel piping to a common "head." From this, flexible hoses connect to nozzle blocks.

One operator can fill foamy type products such as liquid soap and shampoos at a rate of 10 to 40 per minute, depending on size. Eight filling heads. Adjustable from 1 ounce to one gallon sizes. Write for complete information—the coupon is for your convenience.

another **SEMI-AUTOMATIC** by

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Pneumatic Scale Corp., Ltd.
86 Newport Avenue, Quincy 77, Mass. *Branches, Chicago and New York*
Please send us complete information on Samco Jr.

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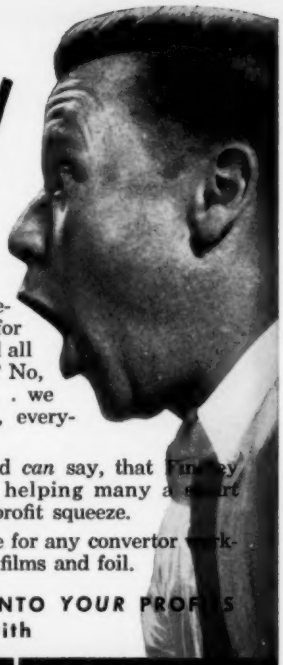
WOW!



HERE'S ONE THAT'S *NOT* BEST!

Make the "best" adhesives in the world for all carton making and all forming operations? No, we can't say that . . . we don't know. Besides, everybody says that.

But we *do* know, and *can* say, that Findley resin adhesives are helping many a smart operator out of the profit squeeze.

They can do the same for any convertor working with paperboard, films and foil.

PUT "WOW" INTO YOUR PROFITS with

Findley's INDUSTRIAL ADHESIVES *exclusively*

Dept. P.E., Milwaukee 45, Wisconsin
Circle No. 275 on Card

High-Speed, Conveyor-line
CODE IMPRINTER
for cans, jars, bottles

Fits in minimum space on any line . . . no line-cutting or dead plates required

Fully automatic MARKOCODER® machine is a versatile packaging line attachment for imprinting *bottoms* of cans, jars, bottles, canisters, paper containers at speeds up to 600 per minute. Keeps products flowing smoothly. Makes consistently clean imprints from rubber type and fast drying fluid ink. Designed for quick code changes, simple maintenance, easy adjustment for different size containers. Install it yourself in a few hours.

Write today for Bulletin "TB"

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Keeps tabs on hourly production *and* count . . . too!

MODEL P2 RM

The Post P2 RM is a preset electronic counter which **also indicates hourly production rate** on a two-scale rate meter. By using this dependable component in conjunction with sheet fed machines, conveyor lines, small parts manufacturing, etc., you have the benefit of "batch" counting desired quantities. At the same time you'll be able to keep tabs on your production flow. A visual totalizer indicates unit or total batch counts.

For complete details write: Decitron

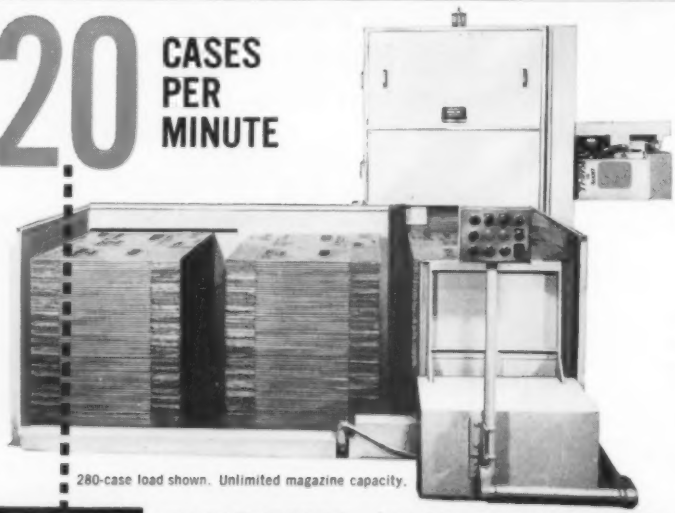
POST ELECTRONIC PRODUCTS

Division of Reid Brothers Company, Inc.

12 LOTHROP ST. / BEVERLY, MASS.

For more information circle No. 277 on Reader Service Card

20 CASES PER MINUTE



280-case load shown. Unlimited magazine capacity.

CARAL SHIPPING CASE FORMER

No operator needed! Fully automatic CARAL unit forms cases at speeds to 20 per minute. Smooth, jam-free operation adjusts to standard and special case sizes; adapts to all standard case packers with a minimum of modification. Easy, floor level loading. Cases formed from top of stack. Units now operating save owners dollars and down time. The *CARAL Case Former* will do the same for *you!*

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the same mechanical principle as a pair of pliers, the instrument crushes a tablet and the force is indicated in lb. and kg./sq. in. Safe testing capacity is 35 lb. A clock-like dial has a single indicator which remains at the tablet-breaking reading after each test and returns to zero when the reset button is pressed. For more information write: Medicinal Chemical Dept., Chas. Pfizer & Co., Inc., Dept. PE, 11 Bartlett St., Brooklyn 6, N.Y., or *circle number on card.*

24—Bottle Elevator

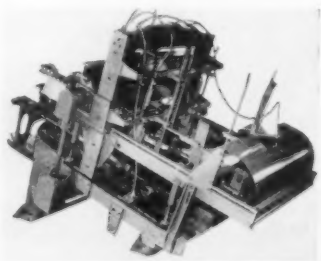
A unit which elevates or lowers bottles and other cylindrical, rectangular, or cartoned products has been designed, making possible multiple-floor handling lines. The unit handles containers while in a vertical position and accepts them from a standard conveyor. Automatically timing them into the elevating or lowering mechanism, it carries them to the required discharge elevation and automatically discharges the containers onto another conveyor. The unit is capable of handling a wide range of sizes and speeds and is equipped with infeed and discharge star wheel for each size container. Speed up to 300 bottles/min. can be accomplished, the maker claims. For more information write: Industrial Assistance Co., Inc., Dept. PE, 30052 Cherry Hill, Garden City, Mich., or *circle number on card.*

25—Strapping Tape

A glass-reinforced creped paper adhesive strapping tape is being produced. The moisture resistant paper tape, known as C-470 strapping tape, is reinforced with 45 continuous glass filaments per inch of width. The rubber-based adhesive is pressure sensitive with adhesion to back of 70 lb./sq. in. Impact strength is 50 in.-lb. and tensile strength is 240 lb./in. width. For more information write: Arno Adhesive Tapes, Inc., Dept. PE, Michigan City, Ind., or *circle number on card.*

26—Case Opener

Model CKCO-3 is a mechanical case opener, former, and positioner with

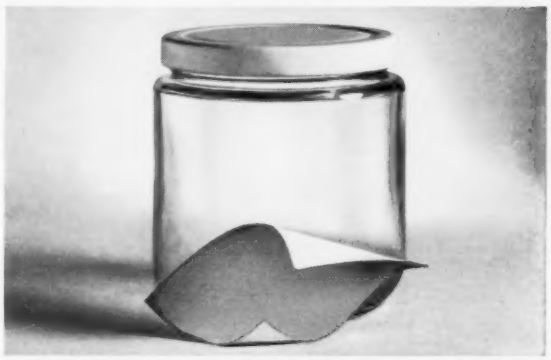


discharge. The machine, says the manufacturer, is just as efficient at

4 COMMON PROBLEMS IN LABELING

(and how the Arabol man helps you solve them)

1. THE LABEL CURLS — If this happens immediately after application, don't blame the adhesive. Such things as paper coating, grain, ink or die-cutting may be at fault. If you're stuck with a huge inventory (it always happens), your Arabol representative may be able to save the day by prescribing an adhesive with higher solids, for faster rate of set. Or perhaps he'll offer helpful suggestions on machine adjustment.



2. THE LABEL FALLS OFF — This usually happens at the worst time — after your bottle reaches the customer. There are two possible reasons: (1) a special silicone coating on the glass is preventing proper adhesion; or (2) if hot liquids are being packed, the adhesive is crystallizing before it forms its bond. The solution? Call your Arabol man. He'll have the formula adjusted so that you get proper adhesion.

3. THE LABEL BLISTERS — Spotty application of adhesive may be to blame. If so, your labeling machine probably needs adjustment. The *bottle* is often the culprit, too. Its surface may contain bulges or hollows. Or, once the adhesive is applied, the label's *printed* side may expand or contract at a different rate from the *underside*. Your Arabol man can usually make the diagnosis and prescribe the cure.

4. THE LABEL IS DISCOLORED — Sometimes unsightly spots appear immediately after the label has been applied. Or, they may crop up weeks later in storage, especially when humidity is high. Either way, something has happened to cause a chemical reaction between paper, ink and adhesive. The solution may call for an adjustment in your adhesive formulation. A problem like this requires some canny sleuthing, but your Arabol man is up to it.

THE BEST WAY to solve adhesive problems is to prevent them from happening. You can begin by telling us *all* the conditions your adhesive must meet—in your plant, in transit and after it reaches your customer. You may not be aware of how important some of these conditions are. To help you understand them more fully, we have prepared an interesting booklet that has saved many of our customers no end of aggravation—and money. It's called "HOW TO BUY ADHESIVES—23 BASIC YARDSTICKS." It makes interesting reading. Send for it today.

ARABOL ADHESIVES

14 PLANTS AND WAREHOUSES TO SERVE YOU ON A LOCAL BASIS

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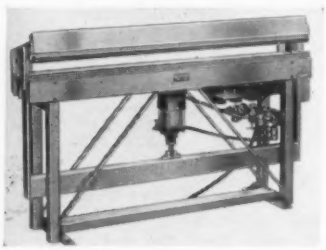
LOS ANGELES • ATLANTA • PHILADELPHIA • BOSTON • PORTLAND, ORE. • ITASCA AND McALLEN, TEX.
CINCINNATI • DENVER • TAMPA • LONDON, ENG.

60-2

low speeds as at higher speeds up to 40 cases/min. The unit handles bottles and cans and is best suited for food products requiring paperboard container packaging. For more information write: Crompton & Knowles Packaging Corp., Dept. PE, Holyoke, Mass., or *circle number on card.*

27—Heat Sealer

A new series of heavy-duty thermal impulse heat sealers which make seals up to 96 in. long, are



being manufactured. Heavy thermoplastic films and laminates can be sealed on all models up to 60 in. long. Larger models up to 96 in. long are designed to seal thinner materials. The operating cycle includes jaw closing, sealing pulse, cooling phase, and jaw opening. Seven models are available with sealing jaw lengths ranging from 42 to 96 in. For more information write: Vertrod Corp., Dept. PE, 2037 Utica Ave., Brooklyn 34, N.Y., or *circle number on card.*

28—Polyethylene Bags

A blown polyethylene film which the processor claims has outstanding optical qualities is now available in bag form. The bags may be obtained in widths from 2 to 45 in., any length, and in gauges from 0.001 to 0.006 in. For more information write: Plastic Packaging Co., Dept. PE, 2035 W. Charleston St., Chicago 47, Ill., or *circle number on card.*

29—Portable Sealer

The new Model 8T portable thermal impulse sealer consists of a separate

power pack and hand-operated sealing tongs. The unit makes a hermetic seal by heating the plastic material to its melting point and then cooling it under pressure. Applications include sealing of large drum liners and bags, enclosing bulky items in polyethylene, and fabricating large items of polyethylene sheet. Seal length is 8 in., seal width is ⅛ in. For more information write: Weldotron Corp., Dept. PE, 841 Frelinghuysen Ave., Newark 12, N.J., or *circle number on card.*

30—Strapping Machine

A new strapping machine automatically applies, tensions, and seals rayon strap on variable-sized packages. Called Model 3201-18 Autobinder, it can band up to 15 packages/min. with 3/16-in. wide rayon strap. Machine automatically adjusts to package sizes ranging from 6x2x8 in. to those measuring 18 in. high, 36 in. wide, and any length. Tying tension is adjustable so that compressible bundles or rigid cartons can be strapped. A magazine on the unit holds 5,000 blanks for steel seals, and rayon strap is dispensed from a spool containing 5,000 yd. For more information write: A. J. Gerrard & Co., Dept. PE, 400 E. Touhy Ave., Des Plaines, Ill., or *circle number on card.*

31—Blister Packager

A high-speed plastic blister packaging machine has recently been developed. Model 05CP has a 28-in.

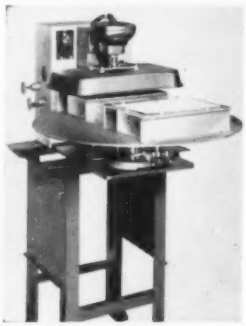


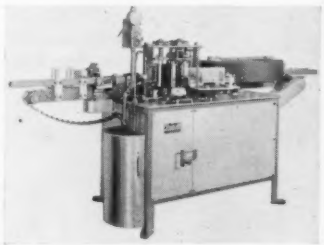
table and will make a blister as large as 10x13x3 in. With modifications, machine will package items up to 10 in. high. Sealing is accomplished in 3 sec. Simple dies can be made from plywood in the user's own plant so that machine can accommodate practically any size or shape of package within its dimensional limitations, according to the maker. For more information write: Erdco Engineering Corp., Dept. PE, Addison, Ill., or *circle number on card.*

32—Viscous Fluid Pump

A new pump attachment adapts the Filamatic filling machine for dispensing semi-viscous and viscous fluids. Identified as Type FDS, the pump will handle heavy oils, adhesives, resins, pigments, etc. The pump attachments are available in 4 sizes to cover a range from 0.06 to 8 oz./stroke. For more information write: National Instrument Co., Dept. PE, 2701 Rockwood Ave., Baltimore 15, Md., or *circle number on card.*

33—Labeling Machine

A new, automatic straight-line, continuous-motion labeling machine is



available for applications where high-speed production capacities are not a factor. The SL-85 labeler may be integrated into any conveyorized line for handling glass and metal containers 1-in. high by ¾-in. diameter to 14-in. high by 7-in. diameter. Round, oval, flat, square, oblong, or tapered shapes can be handled. The labeler applies from 45 to 85 labels/min. and handles foil, paper, or other materials ranging from postage-stamp size to 6 x 7 in. For further information write: MRM Co., Inc., Dept. PE, 191 Berry St., Brooklyn, N.Y., or *circle number on card.*

34—Reinforced Strapping Tape

A strapping tape with adhesion of 60 oz./in. of width and a 12 per cent stretch at break has been developed. Made with a vinyl backing and reinforced with rayon filaments to furnish bi-directional strength, the tape is pressure sensitive and has a tensile strength of 240 lb./in. of width. Strapping tape No. 295 is available in widths from ¼ in. or more and is individually boxed or bulk packaged in 60-yd. rolls. For more information write: Behr-Manning, Dept. PE, Troy, N.Y., or *circle number on card.*

35—Seamless Aerosol

Production of a new 6-oz. aluminum aerosol can without any side seam has been announced. A plain can or a decorated aerosol with four colors and a double internal lining are available. The can shoulder and body, which consists of a single piece of metal, are formed by impact extrusion. Another feature of the container has been the development of a number of internal coating systems designed specifically for aluminum cans. For more information write: American Can Co., Bradley-Sun Div., Dept. PE, 100 Park Ave., New York 17, N.Y., or *circle number on card.* *(End)*

For slitting lightweight, stretchy films

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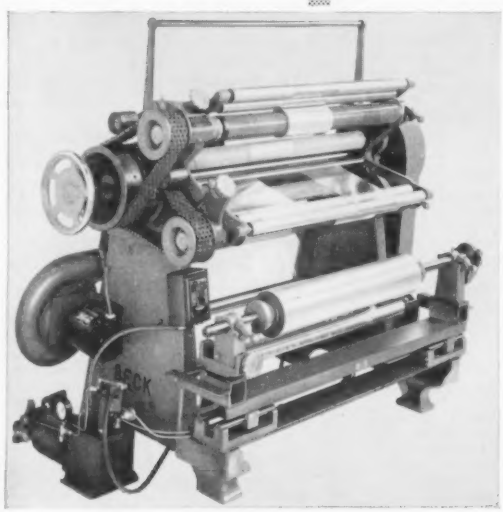

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Fast razor-edge slitting . . . neat, firmly rewound rolls . . . reduced waste . . . low maintenance! That's how the Beck Slitter provides the difference between just adequate slitting and accurate, economical slitting on polyethelenes, plastics and other fine materials. And, in today's ever-tightening cost-squeeze *you* can't afford anything less. For more information on the Beck Slitter, write telling us the material you cut.

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Here's a tissue that drinks HOT MELTS!

Tissues that absorb hot wax, resins, adhesives, or the like, are not new, but you get a big, important extra when you buy Crystal Tissue.

The BIG Crystal extra . . . is its ability to absorb UNIFORMLY across the width of the roll which is particularly important in wet-strength papers.

Have a need for tough tissues that can be twisted, woven, sewed, impregnated . . . whatever your problem, chances are Crystal has or can develop the tissue you need.

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For your convenience, we have also included addresses of suppliers so that you may write directly for more information.

101—Padded Shipping Bags

Three case histories are presented in a leaflet on how and why Jiffy padded shipping bags were used as an interior pack for testing devices, shipping container for books, and shipping bags for do-it-yourself kits. For more information write: Jiffy Mfg. Co., Dept. PE, 360 Florence Ave., Hillside, N.J., or **circle number on card.**

102—Gummed Tape Tips

Two folders list suggestions for getting best results from gummed and reinforced gummed sealing tapes. For more information write: Gilman Paper Co., Dept. PE, 630 Fifth Ave., New York 20, N.Y., or **circle number on card.**

103—Glass Coating

An 8-page booklet, "A Protective Coating For Returnable Bottles," describes the Nu-Glas process for production line coating. Also discussed is the structure and surface of glass and the purpose and types of coatings used. For more information write: Thatcher Glass Mfg. Co., Dept. PE, 375 Park Ave., New York 22, N.Y., or **circle number on card.**

104—Bench Net Weigher

An automatic net weighing machine is described in a data sheet. Unit net weighs and dispenses into containers free-flowing, dry products. Specifications for 3 different types are provided. For more information write: National Instrument Co., Dept. PE, 4123 Fordleigh Rd., Baltimore 15, Md., or **circle number on card.**

105—Steel Pails And Drums

An information sheet illustrates a line of steel pails and drums with capacities from 1 to 12 gal. Lined or plain interiors are available in a variety of gauges. For more information write: Vulcan Containers, Inc., Dept. PE, P.O. Box 161, Bellwood, Ill., or **circle number on card.**

106—Automatic Case Packer

A brochure describes a case packer that is air operated and electrically controlled. Machine handles jars, bottles, cans, or flasks of glass, metal, plastic, or paper. For more information write: Miller Hydro Co., Dept. PE, Bainbridge, Ga., or **circle number on card.**

107—Plastic Packaging

In "Catalog of Ideas," products available are listed and a general discussion on semi-rigid plastic packaging is included. Information is provided on manufacturing procedures, printing, and specifications. For more information write: J-E Plastics Mfg. Corp., Dept. PE, 1780 Broadway, New York 19, N.Y., or **circle number on card.**

108—Wrapping Machines

Two illustrated data sheets and a 4-page brochure describe its line of wrapping machines. An overwrapper, a wrapper for soft goods, and a bundle wrapper are presented. For more information write: Battle Creek Packaging Machines, Inc., Dept. PE, Battle Creek, Mich., or **circle number on card.**

109—Rubberized Hair Cushioning

Hairflex cushioning products are presented in an 8-page brochure, and are said to be resistant to moisture and fungus, is nonabrading, and molds are reusable. For more information write: Armour Alliance Industries, Cushioning Products Div., Dept. PE, 16123 Armour St., N.E., Alliance, Ohio, or **circle number on card.**

110—Strapping Tape

Literature is available on a rayon-reinforced, acetate strapping tape for materials handling and heavy packaging. Suggestions are given for its use in packaging, palletizing, and bundling. For more information write: Johns-Manville Corp., Dutch Brand Div., Dept. PE, 7800 S. Woodlawn Ave., Chicago 19, Ill., or **circle number on card.**

111—Molded Pulp Interiors

A 4-page pamphlet lists advantages of molded pulp shapes for interior packaging. Custom molded, the contoured partitions protect against shock and are particularly adapted to low-cost packaging of fragile items, the maker says. For more information write: Keyes Fibre Co., Dept. PE, Waterville, Me., or **circle number on card.**

112—Wrappers And Carton Formers

Bulletin 170-11-4 lists 16 models of equipment for wrapping, bundling, tray and carton forming, and closing. For more information write: Package Machinery Co., Dept. PE, East Longmeadow, Mass., or **circle number on card.**

113—Package Cushioning

A booklet of 14 pages is devoted to discussion of package cushioning problems such as: cause and prevention of damage, compression resistance, efficiency, cushion factors, drift, set, dusting, etc. Texlite (rubberized hair) and urethane foam are described. For more information write: The B. F. Goodrich Co., Dept. PE, 188 Derby Place, Shelton, Conn., or **circle number on card.**

114—Testing Instruments

A brochure describes and illustrates thickness micrometers, burst-strength testers, and basis-weight scales for testing papers, films, foils, boards, tissues, and other sheet materials. For more information write: E. J. Cady & Co., Dept. PE, 674 N. Harlem, River Forest, Ill., or **circle number on card.**

115—Bag Closers

Specifications and operating features of 4 models of bag closing machines are outlined in a 4-page pamphlet. These continuous-motion machines close and seal paper bags up to 3-lb. capacities. For more information write: George H. Fry Co., Dept. PE, 42 E. Second St., Mineola, N.Y., or **circle number on card.**

116—Adhesives

A booklet describes characteristics of its standard line of adhesive products. Applicable for case sealing and labeling of bottles and cans, the adhesives can be used on film, foil, bags, envelopes, and folding and set-up boxes. For more information write: H. B. Fuller Co., Dept. PE, St. Paul 2, Minn., or **circle number on card.**

117—Stretchable Paper

A folder outlines the advantages of Clupak, a stretchable paper, and some applications. Also included is description of how the stretchability is built into the paper. For more information write: Clupak, Inc., Dept. PE, 530 Fifth Ave., New York 36, N.Y., or **circle number on card.**

118—Sealing Process

A 4-page brochure describes a carton sealing process called Calk-Seal. The maker claims it makes folding cartons sift-proof and infestation-proof. It also eliminates need for inner bags and overwraps. For more information write: Packaging Corp. of America, Dept. PE, 1632 Chicago Ave., Evanston, Ill., or **circle number on card.**

119—Pillow-Type Packagers

Described in a 4-page pamphlet are Robo-Wrap packaging machines. Units will form, fill, and seal pillow-type packages of heat-sealable flexible material. For more information write: Lynch Corp., Dept. PE, Anderson, Ind., or **circle number on card.**

120—Dictionary Of Paper Terms

A 20-page dictionary has been prepared on paper terminology. It lists over 150 definitions of technical terms used in connection with Mosinee moisture- and flame-resistant papers, reinforced, neutral papers, etc. For more

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New Twinkles breakfast cereal package with its fascinating storybook panels was printed by Waldorf, using high speed rotogravure presses to achieve highest quality reproductions.

Waldorf has originated countless packaging ideas that homemakers like. Take advantage of Waldorf's packaging experience ...it will help you sell more of your products. For total packaging service, write or phone Waldorf today!

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information write: Mosinee Paper Mills Co., Dept. PE, Mosinee, Wis., or **circle number on card.**

121—Automatic Capping

Eight different models of automatic bottle-capping equipment are illustrated and described in a 6-page pamphlet. General specifications and a list of users are included. For more information write: Consolidated Packaging Machinery Corp., Dept. PE, Buffalo 13, N.Y., or **circle number on card.**

122—Polyethylene-Blend Coatings

Advantages of A-C polyethylene, an inert, low-molecular weight polymer, are listed in Bulletin P/S 234. Material can be blended with waxes, polymers, and resins in hot-melt or water-emulsified grades. For more information write: Semet-Solvay Petrochemical Div., Allied Chemical Corp., Dept. PE, 40 Rector St., New York 6, N.Y., or **circle number on card.**

123—Adhesives Manual

A manual has been published on pressure-sensitive products, including industrial tapes, bulk adhesives, coatings, and other items of this type. For more information write: Mystik Adhesive Products, Inc., Dept. PE, 2635 N. Kildare, Chicago 39, Ill. or **circle number on card.**

124—Semi-Liquid Bulk Containers

A folder outlines characteristics of Sealkan. Among points covered are: sizes, liquid tightness, weights, ease of handling, filling and assembling, surfaces and coatings, strength, cost, production rates, and uses. For more information write: Sealright Co., Dept. PE, Fulton, N.Y., or **circle number on card.**

125—Label Marker

Model 22W self-stop label marker is illustrated and described in a 4-page pamphlet. Unit automatically marks a variety of labels and simultaneously counts, cuts, stacks, or rewinds them. For more information write: Soabar Co., Dept. PE, 5812 Walker St., Philadelphia 24, Pa., **or circle number on card.**

126—Paper, Film, Foil Bags

A brochure called, "This Is Kennedy," is offered which comes sealed in a "zip-lip" polyethylene bag which may be resealed and reopened repeatedly. Products described include a variety of bags, packages, and other products made of paper, film, and foil. For more information write: Kennedy Car Liner & Bag Co., Inc., Dept. PE, 6000 Prospect Ave., Shelbyville, Ind., or **circle number on card.**

127—Corrosion Inhibiting Papers

A 75-page catalog on inhibitor papers for prevention of corrosion and tarnishing of ferrous and non-ferrous metals is offered. Charts, case histories, glossary of terms, and a set of samples are included. For more information write: Orchard Paper Co., Dept. PE, 3914 Union Bldg., St. Louis 15, Mo., or **circle number on card.**

128—Opening Polyethylene Packages

Findings of experiments with various opening methods for polyethylene-wrapped packages are presented in Technical Release No. 10. The 8-page report discusses peelable seals, perforated film, and tear tapes. For more information write: Union Carbide Plastics Co., Dept. PE, 30 E. 42nd St., New York 17, N.Y., or **circle number on card.**

129—Packaging Check List

A packaging check list covers packaging and its relation to storage problems, inventory control, box assembly, materials handling, packing and shipping, warehousing, and display. For more information write: Metal Edge Industries, Dept. PE, Barrington, N.J., or **circle number on card.**

130—Pallet Loaders

Offered is a 16-page booklet on automatic pallet loaders for corrugated containers. Discussed are advantages of pallet loading and the operation of the machines. For more information write: Lamson Corp., Dept. PE, Lamson St., Syracuse 1, N.Y., or **circle number on card.**

131—Vial Filler/Capper

Information is available on the Capsolut Cartrix unit for automatically feeding, capping, and sealing small bottles and vials. For more information write: Arenco Machine Co., Inc., Dept. P.E., 25 W. 43rd St., New York 36, N.Y., or **circle number on card.**

132—Fluted Cushion Trays

Characteristics and applications of protective packaging with fluted paperboard trays are stated in a brochure. A variety of styles and choices of cover flaps are outlined. For more information write: Rondo of America, Inc., Dept. PE, 100 Sanford St., Hamden 14, Conn., or **circle number on card.**

133—Services For Food Packers

A 26-page booklet discusses research, engineering, and field services for food packers. Also described are production aids such as unscramblers, transfer discs, head spacers, coders, air cleaners, etc. For more information write: White Cap Co., Dept. PE, 1819 N. Major St., Chicago 39, Ill., or **circle number on card.**

134—Tapers, Labelers, Sealers

Catalog No. 107 describes 58 models of sealers and Counterboy taping and labeling equipment. Specifications and prices are included. For more information write: Better Packages, Inc., Dept. PE, 253 Canal St., Shelton, Conn., or **circle number on card.**

135—Urea Molding Compounds

Technical data are available on Bettle urea molding compounds (urea formaldehyde resin and highly refined alpha cellulose.) The 5-page report outlines properties of the resin. For more information write: American Cyanamid Co., Plastics and Resins Div., Dept. PE, 30 Rockefeller Plaza, New York 20, N.Y., or **circle number on card.**

136—Protective Materials

Fiberglas, a protective packaging material, is described in a 4-page data sheet. Material is available in a variety of densities and compression resistances. For more information write: Owens-Corning Fiberglas Corp., Dept. PE, National Bank Bldg., Toledo, Ohio, or **circle number on card.**

137—Heat-Sealing Crimpers

Three models of heat-sealing crimpers are presented in a 4-page pamphlet. Automatic and semi-automatic units

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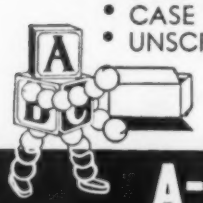

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crimp and seal foil, cellophane, and similar materials. A choice of 6 sealing patterns are offered. For more information write: Wrap-Ade Machine Co., Inc., Dept. PE, 188 Sargeant Ave., Clifton, N.J., or **circle number on card.**

138—Semi-Automatic Wrappers

Two models of semi-automatic wrapping machines are described in a leaflet. General features and specifications for each model are given. For more information write: Elgin Mfg. Co., Dept. PE, 200 Brook St., Elgin, Ill., or **circle number on card.**

139—Baggers/Weighers

Presented in a 34-page illustrated booklet are bagging and weighing systems, Junior weigher, candy cleaner, electronic weigher, and other machinery. General descriptions and specifications of each are included. For more information write: Wright Machinery Co., Div. of Sperry Rand Corp., Dept. PE, Durham, N.C., or **circle number on card.**

140—Handling Cellophane

Nine rules for storing and handling cellophane are outlined in a brochure. With it, user may check proper methods to assure maintaining material in prime condition. For more information write. American Viscose Corp., Film Div., Dept. PE, 1617 Pennsylvania Blvd., Philadelphia 3, Pa., or **circle number on card.**

141—Cartons

A booklet, "Weyerhaeuser Ingenuity At Work In Packaging," presents the research and production facilities offered by this company. For more information write: Weyerhaeuser Co., Boxboard & Folding Carton Div., Dept. PE, 919 N. Michigan Ave., Chicago 11, Ill., or **circle number on card.**

142—Blister Packager

A circular about the Model 58 Packmaster provides information on the variety of blister packages unit will form, how it operates, and specifications. For more information write: Sundstrand Machine Tool, Dept. PE, Belvidere, Ill., or **circle number on card.**

143—Printing On Foil

Suggestions are offered in a booklet for lithographing aluminum foil. Included are pointers on advantages of lithography, selecting laminated foil stocks, cutting and feeding the stock, etc. For more information write: Anaconda Aluminum Co., Dept. PE, Louisville, Ky., or **circle number on card.**

144—Multiple Packet Filler

Described in a brochure is the BFM Multiple Packeter which forms, fills, and seals liquid or dry products in individual service packets of foil, film, or paper laminates. For more information write: Brown Filling Machine Co., Inc., Dept. PE, P.O. Box 452, Ann Arbor, Mich., or **circle number on card.**

145—Gravure Top Lacquers

A chart provides data on end-use recommendations for Pyroxcote gravure top lacquers. Specific types of labels, packaging materials, and various types of protective coatings desired are itemized and a specific lacquer is listed for each application. For more information write: Pyroxylin Products, Inc., Dept. PE, Chicago 32, Ill., or **circle number on card.**

146—Automatic Cartoners

An 8-page pamphlet tells of two models of the CMV automatic cartoning machine. Units perform all operations starting with a carton blank and ending with a loaded carton. For more information write: R. A. Jones & Co., Inc., Dept. PE, Box 485, Cincinnati 1, Ohio, or **circle number on card.**

147—Vibration Tester

Specifications and other information are available on the No. 250-V vibration tester. The 250-lb. tester was designed to handle smaller sizes of packages. For more information write: Gaynes Engineering Co., Dept. PE, 1648 W. Fulton St., Chicago 12, Ill., or **circle number on card.**

148—Fitment Applicator

A catalog sheet gives details on the operation and specifications for the automatic FAB fitment applicator. It will handle both solid caps or perforated types of plastic fitments. For more information write: Resina Automatic Machinery Co., Inc., Dept. PE, 572 Smith St., Brooklyn 31, N.Y., or **circle number on card.**

149—Carton Imprinter

An illustrated data sheet describes the Cartoncoda, a high-speed carton coding, lot and control numbering machine. For more information write: Adolph Gottscho, Inc., Dept. PE, Hillside 5, N.J., or **circle number on card.**

150—Polymer Powder

Kel-F is a plastic molding powder which has a variety of applications, including extruding material for film. In Bulletin H-JGIFr(68.5)JR, nine

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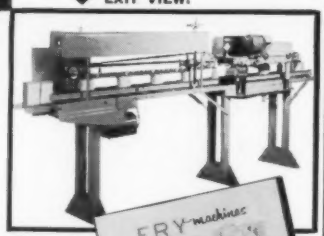

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pages of charts, graphs, and technical data are given on its physical and mechanical properties. For more information write: Minnesota Mining & Mfg. Co., Chemical Div., Dept. PE, St. Paul 6, Minn., or **circle number on card.**

151—Cartoning Equipment

Portable automatic cartoning equipment is described in an illustrated brochure. Details on adaptations and accessories, as well as special combinations, are explained. For more information write: Bivans Corp., Dept. PE, 2431 Dallas St., Los Angeles 31, Calif., or **circle number on card.**

152—Wet-Proof Boxes

Boxes made from M/R board are illustrated and described in a booklet which states that these corrugated containers introduce a new way to ship wet products. For more information write: Hinde & Dauch Div., West Virginia Pulp and Paper, Dept. PE, Sandusky, Ohio, or **circle number on card.**

153—Heat-Seal Labels

A brochure reports the advantages and variety of uses for the company's roll-type, heat-seal labels. For more information write: Oliver Machinery Co., Label Div., Dept. PE, Grand Rapids, Mich., or **circle number on card.**

154—Liquid Fillers

Bulletin 148 covers a variety of semi-automatic and rotary models of liquid fillers. Vacuum and gravity fillers are also included. Specifications and descriptions are given for each. For more information write: Pneumatic Scale Corp., Ltd., Dept. PE, Quincy 71, Mass., or **circle number on card.**

155—Fluted Board

C-flute corrugated board is discussed in a folder which gives a comparison table of compression tests of conventional C-flute boxes and those made with O-I C-flute and presents published comments on the new board. For more information write: Owens-Illinois, Paper Products Div., Dept. PE, Toledo 1, Ohio, or **circle number on card.**

156—Resin Adhesives

Information about the expanded line of Solu-Rez multi-purpose polyvinyl acetate resin adhesives is available. For more information write: Morningstar-Paisley, Inc., Dept. PE, 630 W. 51st St., New York 19, N.Y., or **circle number on card.**

157—Multiple Packaging Machine

A brochure is offered describing equipment which automatically cluster-wraps products in a variety of shapes and sizes. For more information write: Mead Packaging Inc., Atlanta Paper Co. Div., Dept. PE, Atlanta 2, Ga., or **circle number on card.**

158—Vibratory Equipment

In condensed catalog No. 605, vibratory materials handling equipment, vibrating parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers, and portable power tools are listed. For more information write: Syntron Co., Dept. PE, 269 Lexington Ave., Homer City, Pa., or **circle number on card.**

159—Bottle Cottoner

Model 52 bottle cottoning machine is described and illustrated in a bro-

chure. Portable and automatic, the unit handles up to 100 bottles/min. For more information write: The Lakso Co., Inc., Dept. PE, Fitchburg, Mass., or **circle number on card.**

160—Shipping Bag

Literature is available on the Corro-Bag, a cushioned shipping bag which is constructed from corrugated. Sizes range from 5½x10 in. to 14¾x20½ in. For more information write: Sherman Paper Products Corp., Dept. PE, Newton 64, Mass., or **circle number on card.**

161—Protective Papers

A new swatch booklet contains 23 representative samples of the more than 200 grades and basis weights of glassine and greaseproof papers available for protective packaging and a variety of industrial uses. For more information write: Glassine and Greaseproof Manufacturers Assn., 122 E. 42nd St., New York 17, N.Y., or **circle number on card.**

162—Bagging Machines

Data sheets are available on a variety of semi-automatic bagging machines for various applications. Units are custom-built for type of operation and most types of bag materials can be handled. For more information write: Tele-sonic Packaging Corp., Dept. PE, 208 W. 27th St., New York 1, N.Y., or **circle number on card.**

163—Glue Gun

Information is available on a dual-purpose, roller-type FF glue gun engineered for use on automatic packaging equipment. Glue can be applied in various widths and in either stripes or ribbon patterns. For more information write: John P. Fox Co., Inc., Dept. PE, 1107 S. Mountain, Monrovia, Calif., or **circle number on card.**

164—Coil Wrap Papers

A sample kit is offered on protective coil wrap papers for automatic machine wrapping of metal strappings and wires, plastic and rubber hose, etc. Material is described in file No. L-1-A. For more information write: Thilmany Pulp & Paper Co., Dept. PE, Kaukauna, Wis., or **circle number on card.**

165—Electric Eyes

A 6-page brochure covers information and developments in design and application of electric eyes. Various types of other measuring units are also included in Bulletin 577. For more information write: Photomation, Inc., Dept. PE, 96 S. Washington Ave., Bergenfield, N.J., or **circle number on card.**

166—Polypropylene

Describing its polypropylene, Escon, an illustrated folder is available. Characteristics discussed are: heat-sealing latitude, barrier properties, machineability, clarity, etc. For more information write: Enjay Co., Inc., Dept. PE, 15 W. 51st St., New York 19, N.Y., or **circle number on card.**

167—Container Feeder

Operating features and specifications of a container feeder which handles a variety of glass, cans, jars, etc. which are received in reshipper cases are given in an illustrated folder. For more information write: U.S. Bottlers Machinery Co., Dept. PE, 4015 N. Rockwell St., Chicago 18, Ill., or **circle number on card.**

(Turn page)

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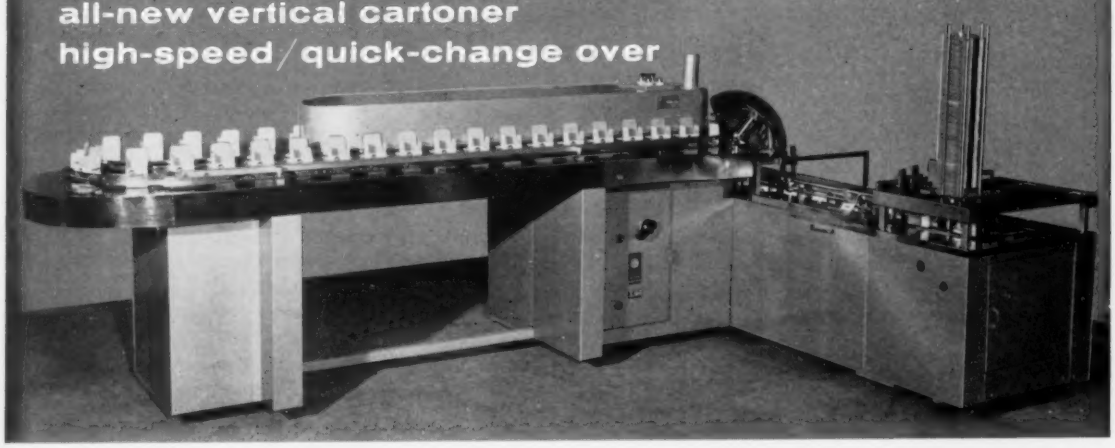

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A message to

Package research and development departments
Engineering departments
Technical and research libraries
Everyone concerned with what is being written in the world of packages

We recently were appointed American agents for *Packaging Abstracts*, published by the British research association PATRA—The Printing, Packaging & Allied Trades Research Association. This service gives you, in a single, handy periodical (published monthly, plus an annual index), brief summaries of packaging articles that have appeared in some 200 packaging magazines plus over 150 magazines devoted to printing and allied subjects, and numerous patents, books, pamphlets, and technical data provided by makers of machinery and materials.

This publication is unlike any other abstracting service in the world. It covers technical and operational packaging; it abstracts not only English language periodicals, but translates and abstracts foreign language publications from Germany, Russia, France, and every country in the world that publishes periodicals concerned in whole, or in part, with the various phases of packaging.

At present, each issue is divided into 18 main sections, including among others such subjects as packaging materials, adhesives, labels, coatings, and packaging machinery.

How To Use *Packaging Abstracts*

Suppose you are interested in finding out what has been written on cushioning. You would refer to the section on cushioning. A recent issue abstracted seven articles on the subject, that had appeared in one American magazine, two British, one Canadian, and two U.S. military reports. Perhaps the abstract would give you the information you want; if not, you could request a complete reprint or copy of the original publication. The same issue, for instance, abstracted 13 articles on plastic containers. An average issue carries about 400 abstracts based on literature received from all parts of the world.

The Cost Is Nominal

It costs thousands of dollars to collect, translate where necessary, evaluate, and abstract pertinent articles. Each month, literally thousands of pages of editorial material are read and the final result put into a handy 5½ x 8½-in. booklet averaging around 75 pages a month, plus the annual index. You can receive the 12 monthly issues plus the annual index for a total annual subscription price of only $42.00.

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168—Printing Scale

Information is available on Printweigh scales which provide weight records printed on forms, tickets, strips, or transmitted electrically for recording on remote adding or other business machines. For more information write: Toledo Scale Co., Dept. PE, Toledo 12, Ohio, or **circle number on card.**

169—Machine-Grade Nails

An illustrated fold-out chart on machine-grade nails has been published. It shows the types of heads, shanks, and points which are available. For more information write: Powasert Dept., United Shoe Machinery Corp., Dept. PE, 140 Federal St., Boston 7, Mass., or **circle number on card.**

170—Tying Machines

Brochure No. 200 shows the versatility of automatic package-tying machines and describes what the machine does, how it operates, and the advantages of automatic tying. For more information write: B. H. Bunn Co., Dept. PE, 7605 Vincennes Ave., Chicago 20, Ill., or **circle number on card.**

171—Silicone Products

A summary of the forms, properties, and applications of Dow Corning silicones is contained in a 16-page booklet. Silicone products are also reviewed. For more information write: Dow Corning Corp., Dept. PE, Midland, Mich., or **circle number on card.**

172—Wrapping Machine

The Wrap-King model CK/DW is described in a specification sheet. A variety of films may be used to wrap candy, baked goods, tapes, etc. For more information write: Crompton & Knowles Packaging Corp., Dept. PE, Holyoke, Mass., or **circle number on card.**

173—Soft Drink Equipment

A tab-indexed booklet describes the equipment necessary for setting up lines for the canning of soft drinks. Low-, medium-, and high-speed production machinery is covered. For more information write: Continental Can Co., Dept. PE, 100 East 42nd St., New York 17, N.Y., or **circle number on card.**

174—Humidity Indicator Cards

The new Humi-Card No. 693470 is a humidity indicator card for general packaging use. Various types are available which meet military specifications. Product is described in Product Catalog No. C-1. For more information write: Culligan, Inc., Dept. PE, Northbrook, Ill., or **circle number on card.**

175—Polyester Film

An 8-page pamphlet shows properties and suggested applications of Mylar polyester film. Charts give physical, electrical, and thermal properties and show ranges of resistance to chemicals. For more information write: Cadillac Plastic & Chemical Co., Dept. PE, 15111 Second Ave., Detroit 3, Mich., or **circle number on card.**

176—Electric Stapler

A brochure illustrates uses of a new portable, automatic electric stapling machine. For more information write: Staplex Co., Dept. PE, 777 Fifth Ave., Brooklyn 32, N.Y., or **circle number on card.**

(End)

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- *Eliminates* packing line slowdowns and shutdowns.
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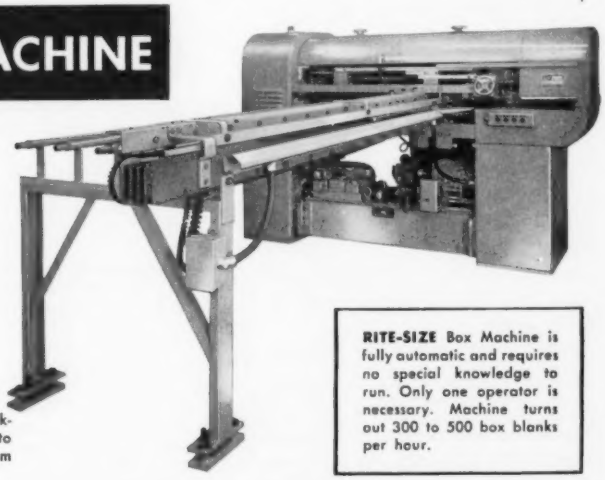


The Rite-Size Box Machine with auxiliary equipment is designed to make corrugated cartons right in your own plant — as you need them. It produces any size and style box you require, in small or large lots, quickly, accurately, and at lower cost! (A complete change in carton dimensions takes only a minute and one-half).

With a Rite-Size Machine, box production can be coordinated with packing line requirements . . . to eliminate slowdowns and shutdowns due to carton shortages. Packaging is better, too, because cartons can be custom dimensioned to your products.

A complete box making department takes only 1600 square feet of space, *including storage*. Reductions in carton storage areas alone have resulted in floor space savings as high as 90% in many plants!

RITE-SIZE Box Machine is fully automatic and requires no special knowledge to run. Only one operator is necessary. Machine turns out 300 to 500 box blanks per hour.

Investigate the advantages of "in-plant" box making, today. There's no obligation. Write, phone, or wire for complete details.

COLT PACKAGING MACHINERY COMPANY 53 WASHINGTON AVENUE, CRANSTON 7, R. I.

Note No. 20: Drop-testing technique for boxes—Part II

By K. Q. Kellicutt,
Engineer, Forest Products Laboratory, Forest Service, U.S. Department of Agriculture, Madison, Wisconsin

Introduction. In Note No. 19 (2), a method of making a reproducible drop test of corrugated containers was described in which each box of the lot to be tested is dropped only once. The technique can be used to evaluate the drop-test resistance of various grades of materials, the effect of the weight of load on the rough-handling resistance, and the effect of moisture content of fibreboard relative to its rough-handling characteristics.

Grades Of Material

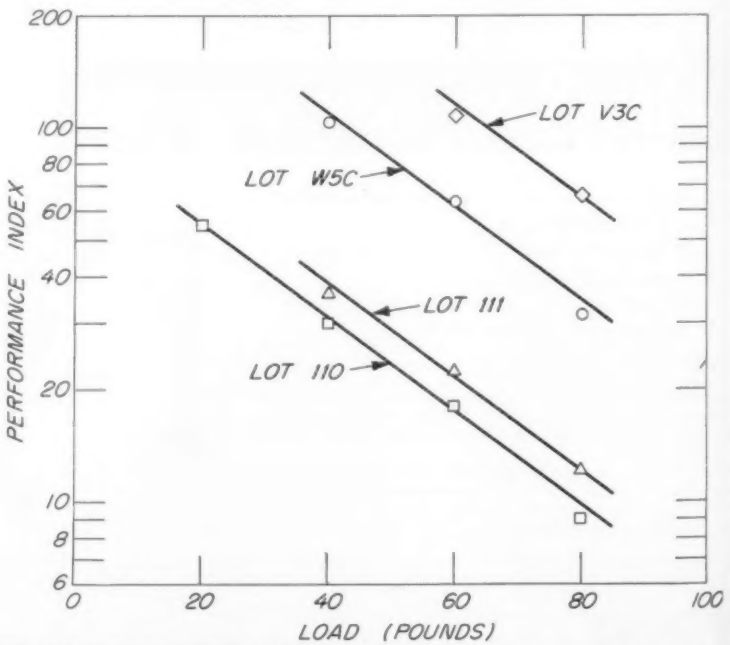
With the previously described drop-test procedure, the grades of material are easily separated into classes in accordance with their resistance to rough handling. This becomes very apparent when plottings are made of the performance index values* for various grades of boxes when tested with several different loads.

For example, it may be seen that the four curves in the illustration all have the same slope, and the only difference in them is their position on the plotting. The lot designated as V3c is appreciably better than Lot W5c which is next best in performance. According to the bursting strength test, the V3c tested 480 lb./sq. in., while the burst for W5c was 376 lb./sq. in. Lot No. 111, which was considerably below W5c, tested 244 in burst, and was about 40 points better than the lowest of this group of four, Lot No 110, that had a bursting strength test value of 206 lb./sq. in. Other boards will be found to arrange themselves accordingly.

Box Load—A Factor Of Rough Handling

It is a fundamental fact that the greater the weight of the box and its contents, the more severe the impact will be if it is dropped on a solid surface. Therefore, as may be expected, for a specific grade of fibreboard box, the greater loads will cause failure from lesser heights of drop. This is also illustrated by the curves in the illustration. Here it may be seen that the *performance index numbers vary inversely as the load in the containers.*

For example, it is shown that, for the material represented as Lot No. 110, a performance index of about 55 was attained for boxes tested with a 20-lb. load. The performance index value, however, may be seen to be about 9 when established for an 80-lb. load in boxes made from the same material and tested in the same manner. The same kind of relationship exists for boxes made from the other three boards that have been included in



RELATIONSHIP OF "PERFORMANCE INDEX" values and weight of contents for several grades of B-flute Fourdrinier kraft boxes. Performance index values were determined by single-drop test, and made after boxes had been conditioned at 75°F. and 64 per cent R.H.

*Performance index number is represented by an average of the lowest height of drop that caused failure in a single drop and the greatest height of drop that did not cause failure.

Memo to Keith Kellicutt:

This completes your series of 20 helpful notes. On behalf of our readers, thanks for a diligent job of writing. And thanks, too, for meeting every deadline.—R.B.H.

the plotting. This is apparent in that all of the curves have the same slope, and each one fits the points well for the board it represents.

Predicting Rough Handling

As the relationship between weight of contents and performance index may be expressed as a straight line on semi-logarithmic paper, an equation was developed with which the performance index can be predicted for any load in the box, providing the performance index is known for one load (3).

Moisture Content And Its Relation To Rough Handling

It was previously pointed out in Note No. 13 *(1)* that the relationship of moisture content to compressive strength was quite different than it was to rough handling, such as in the drop test. Each increase in moisture content of the fibreboard results in a decrease in the compressive strength of the box, while, in resisting the impacts of a drop, this same relationship does not hold. Rather, there is a range of relatively high moisture contents at which the rough-handling resistance is optimum.

The reason for this is that, when a box is dropped, it must have a certain amount of flexibility and toughness in order to resist the impact stresses it encounters. These properties are not present in the proper proportions when the moisture content is low. For example, at a moisture content of about 5 per cent, the various grades of fibreboard boxes had too little flexibility. At a moisture content of about 10 per cent, the rough-handling resistance of the boxes increased appreciably. The maximum rough handling (the highest performance index numbers) was attained when the moisture content of the fibreboard was about 20 per cent. When the moisture content was high—30 per cent or above—the rough-handling resistance was lower.

Some actual performance index numbers for several grades of No. 10 can size corrugated fibreboard boxes (18-5/8x12-5/16x7-1/4 in.) with four different weights of a No. 10 can load are given in Table I.

Another set of tests was made to determine the effect of size and shape of a container to its rough-handling resistance. This was done by using, in addition to the No. 10 can size box, a box that was twice as large and held 12 No. 10 cans for a load, and was 18-5/8 in. long, 12-5/16 in. wide, and 14-1/8 in. deep. The third size box held 24 No. 2 cans and was 13-3/4 in. long, 10-5/16 in. wide, and 9-3/4 in. deep.

TABLE I

Performance Index Values Obtained From Drop Tests Of Boxes Having Various Loads

Lot No.	Flute	Liners	Bursting Strength		Performance Index Values (in.) For Different Loads (lb.)			
			Class	Actual	20	40	60	80
98	B	Jute	125	167	60.0	22.5	13.5	9.0
99	B	Jute	350	356	——	52.5	31.5	18.0
101	A	Jute	200	224	87.0*	48.0*	27.0*	15.0*
102	A	Jute	275	319	——	70.5*	49.5*	25.5*
104	B	Jute	175	351	——	48.0	27.0	23.0
106	B	Jute	275	366	——	46.5	28.5	22.5
107	A	Jute	350	522	——	67.5*	55.5*	40.5*
110	B	Kraft	125	206	55.5	30.0	18.0	9.0
111	B	Kraft	200	244	——	36.0	22.5	12.0
112	B	Kraft	350	439	——	87.0	58.5	51.0
W5c	B	Kraft	275	376	——	102.0	63.0	31.5
V3c	B	Kraft	400	489	——	——	108.0	66.0

*Boxes conditioned in an atmosphere maintained at 75°F. and 64% R.H. All others conditioned at 73°F. and 50% R.H.

TABLE II

Performance Index Numbers* For Three Different Size Boxes At Four Load Levels And For Three Kinds Of Loads

Weight Of Load In Box (lb.)	Performance Index Numbers (in.) Number Of No. 10 Cans In Box		
	6	12	24
175-lb. Test, A-Flute Boxes			
20	78.0	——	67.5
40	41.5	60.0	28.5
60	25.5	30.0	21.0
80	13.5	25.5	13.5
200-lb. Test, B-Flute Boxes			
20	66.0	99.0	43.5
40	25.5	30.0	16.5
60	15.0	25.5	7.5
80	10.5	16.5	4.5
200-lb. Test, Solid Fibreboard			
20	52.5	102.0	57.0
40	30.0	45.0	22.5
60	16.5	30.0	12.0
80	12.0	19.5	9.0

*Performance index number is represented by an average of the lowest height of drop that caused failure in a single drop and the greatest height of drop that did not cause failure.

The performance index numbers obtained in tests of these boxes were closely related to the concentration of load in the boxes. For example, the box with 12 No. 10 cans, which had the highest performance index numbers, also had the largest volume; hence, the greatest area of fibreboard and the lowest load per square inch of board. The next lowest load per square inch of box material was found for the boxes having 6 No. 10 cans, while the heaviest load per square inch of box material was for the box having 24 No. 2 cans. This box also had the lowest performance index numbers. The values for these tests are included in Table II.

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(1) Kellicutt, K. Q., "Note No. 13: Compressive strength of boxes—Part III," PACKAGE ENGINEERING **5** (1960), No. 2 (Feb.), p. 94.

(2) Kellicutt, K. Q., "Note No. 19: Drop-testing technique for boxes—Part I," PACKAGE ENGINEERING **5** (1960), No. 8 (Aug.), p. 110.

(3) Kellicutt, K. Q. and Landt, E. F., "Strength evaluations of corrugated containers by the drop-test method," *Tappi* **39** (1956), No. 9 (Sept.). *(End)*

Finding fill per cent

(Continued from Page 46)

ages. The standards must not be arbitrary but should be based on the characteristics of the particular item to be packaged and on other factors. It is recommended that standards be set in increments of 5 per cent; that is, 55, 60, 65 per cent, etc.

It may be desired to set standards for minimum per cent fill for a number of items already in production where a change in bag size is not necessarily contemplated. Consider the data on six different gum candies, all packaged at the same net weight in identical pouches. (See table.)

Obviously, a minimum fill-standard of 50 per cent can be set for these items as a group (even though two items considered individually could meet a higher standard of 55 per cent). This figure is not arbitrary but is based on per cent fill determinations on actual production packages. Therefore, it is a standard that can be adhered to without difficulty.

Look At Each Item Separately

In setting minimum fill-standards, it is of the highest importance that each item, or group of similar items, shall be considered separately. For instance, it would be unrealistic to expect to be able to set a high fill-standard for jelly beans. These small, free-flowing objects naturally pack very closely when shaken down, and a fill determination made by the rapeseed method would probably result in a fill of 45 to 55 per cent in some commercial packages. Also, this is an item with high moisture content. If, in the interest of a higher per cent fill, a bag is too tight, the candy could become clumped and unsalable.

Marshmallow items, usually large, bulky and not free-flowing, require a rather large pouch (with a low per cent fill) to facilitate supermarket stacking without crushing the candy.

The question of stacking is extremely important in these days of increasing competition for shelf space. Some supermarket chains demand a bag which lies flat on the shelf to permit stacking other bags on top of it. Bags which are so full that they are rounded cannot be efficiently handled where stacking is practiced. Where candy is not stacked on shelves but dump-displayed, this factor is not so important.

Besides considerations of size, shape, texture and moisture content of the product, other factors must be weighed in deciding the dimensions of the pouch. For instance, individually cellophane-twist-wrapped pieces take up more volume while the twist wrap is fresh and stiff than when handling has flattened and loosened the wrap. This may cause disagreement between production personnel who demand more head room in the package and other personnel who are concerned about a low figure for per cent fill. We certainly do not advocate piling up production trouble and sacrificing machine speed merely to use a smaller bag.

Bag Machine May Be A Factor

Sometimes when difficult products are to be packaged, the ultimate decision on bag size must be left up to the machinery supplier. There must be no possibility of lollipop sticks or macaroni strands getting caught in the seal areas.

Possibly a given pouch has too low a per cent fill and must be reduced in size. On machinery that forms, fills, and seals the bag, the adjustment of the width of the pouch is a time-consuming operation. On the other hand, adjustments of the length of the bag are easily made. Therefore, a reduction in length is usually proposed when it is desired to increase the per cent fill.

Unfortunately, no one can reliably predict what reduction in length will result in a given increase in per cent fill. We have seen pouches that were reduced by ½-in. increments until they obtained a squat, unpleasing shape. In such instances, it is more desirable to undertake a reduction in the width of the bag as well as in the length.

Use Same Film And Bag Style

When new items are submitted to the laboratory for a per cent fill determination, it is extremely important that the proposed pouch be duplicated exactly. For example, we have been requested to determine the fill for a tube-style pouch when a pillow-type has actually been proposed; or for a polyethylene bag when cellophane or saran was proposed.

We have observed that differences in pouch style or in packaging material, even when the bag dimensions are identical, can affect the product volume, insofar as style, and/or material affect the rigidity of the pouch. Candy pieces, for example, do not shake down as much in 0.004-in. thick polyethylene as in 0.0015-in. film.

We have found the rapeseed method most useful in determining the capacity of tube-style, pillow-style, and thin-sealed pouches. The product volume of free-flowing goods, such as candy, of soft products, such as cottage cheese and sauerkraut, and of more rigid products, such as macaroni, can also be easily determined. The per cent fill information thus obtained is recommended as an aid in deciding the proper size of a flexible pouch.

(End)

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What we think

Do you grasp packaging as part of a flow?

Professionalization often brings with it an insulation against activities outside one's professional scope. Packaging professionals must avoid letting this happen to them.

Significant trends in product manufacturing and distribution make it more and more necessary for packaging people to get a broader view of their work. In fact, if they don't, they may miss out on major opportunities for enhancing their usefulness to their companies.

Expanding product lines pose new problems

Where a packaging specialist does open his thinking to take in what is going on all around him, he soon sees that the overall distribution of his company's products is going through change if not out and out upheaval. Top management is coming to view distribution as a whole system or set of coordinated processes.

For one thing, most companies make different products or models and find increasing difficulty in meeting customer requirements. Those in charge of packaging material selection and packaging line operations know how broadened product lines compound their difficulties and bedevil them with scheduling and change-over problems.

But what they may be too busy to note is that management sees real opportunities for cost reduction through closer inventory control, improved warehousing and transportation, and better processing of information—including automation and electronic data processing in offices. It is time that those in packaging take a closer look at these.

As trends become apparent to management, companies sometimes get carried away. They put in fancy warehouse mechanization and provide the latest in equipment without realizing that use of faster packaging equipment might permit meeting distribution needs with less warehousing equipment or fewer warehouses. Sometimes they go overboard on computers and data processing equipment.

But the packaging team or packaging man will not be able to advise his top management pro or con unless he gets the full picture and sees precisely how packaging fits into the flow of goods into distribution from his particular company. Doing this makes him walk a fine line.

On one side he must be alert to all opportunities and see how packaging techniques on production lines or control of packaging inventories, for instance, can adjust to and serve expanding product lines. On the other side, he must avoid going overboard in a rush to what he regards as "keeping up with the corporate Joneses," and he must be sure his contentment with a smooth-running packaging operation does not act as a brake on or a dam against progress.

One way to avoid this trouble is to develop a well-rounded view of what is going on in the company. You must see what is happening to your distribution process if you are to fit your packaging operations to it.

For example, should a company centralize more of its manufacturing to turn out more efficiently the range of product models its customers demand? Should it decentralize its making of products to get closer to certain markets? How can you reduce inventory time and cut down warehouse space? What can packaging people contribute to better distribution through making the packaging line more efficient?

Don't lose sight of your own company's goals

Management's frequent lack of appreciation of packaging or its taking the package for granted is no reason for getting discouraged. We know this is a problem because the topic comes up in meeting after meeting around the country. And we know it is small comfort to the packaging man trying to hold the line merely to tell him that all he needs is better communication.

Even though he does need this, before he can interpret packaging and its importance to his management, something else comes first: You must be sure you see the relationship of packaging to all the other key factors in your distribution. Barring the occasional empire builder who would take unfair advantage of your cooperative gesture, we submit there is much to gain from trying to see just how helpful you can be to other segments of the distributive system.

Bruce Hollingsworth

Editor

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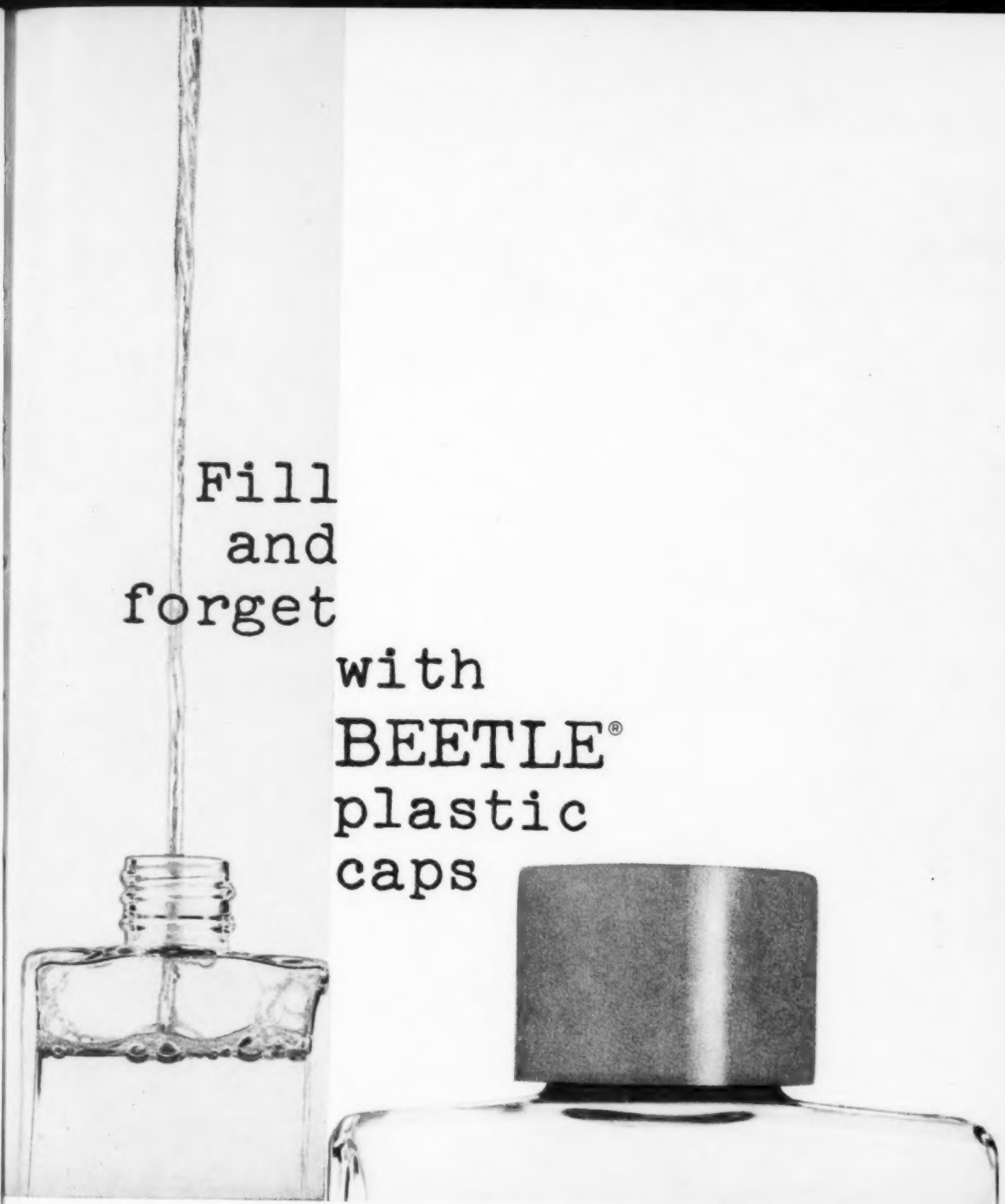

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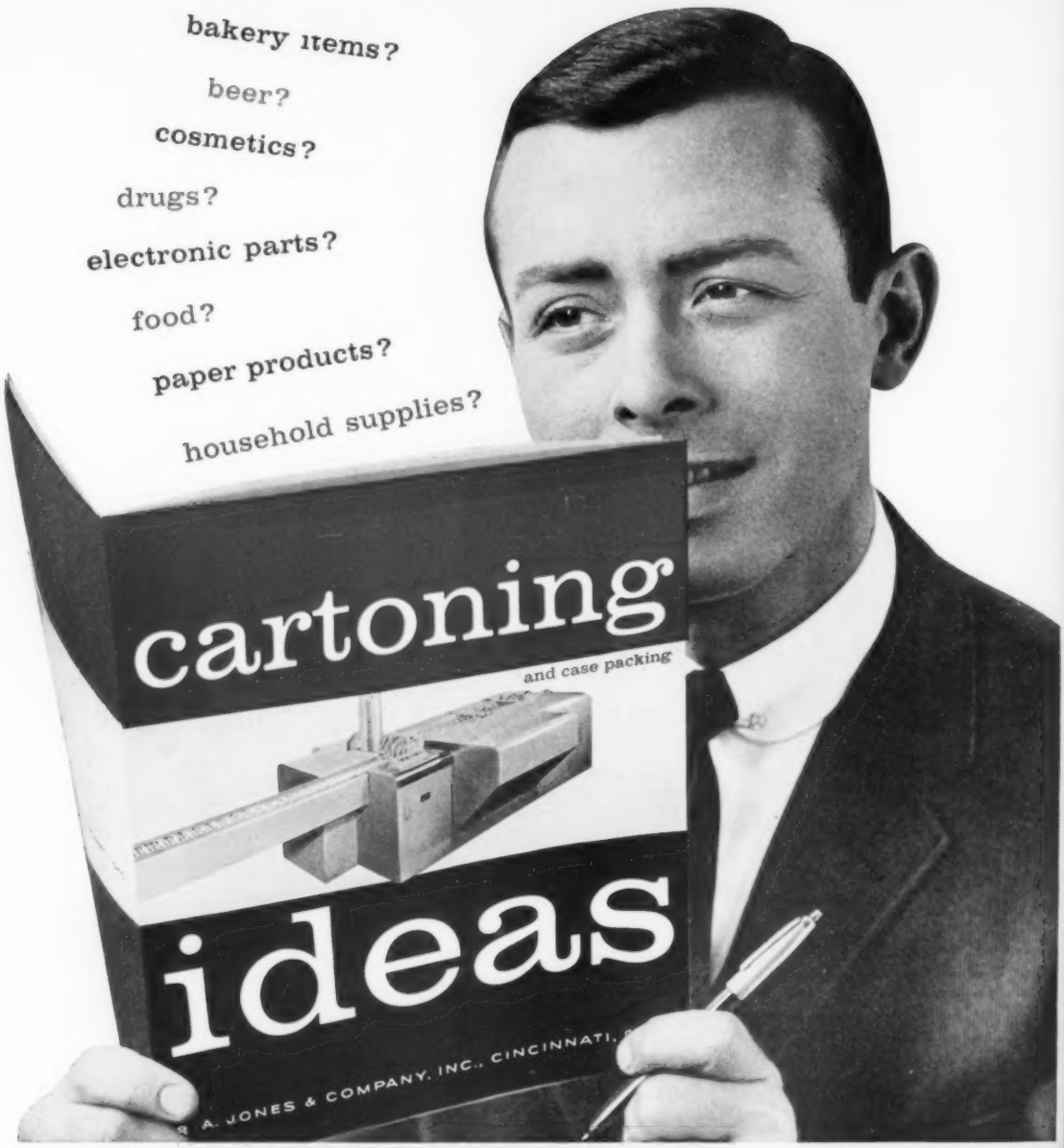

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